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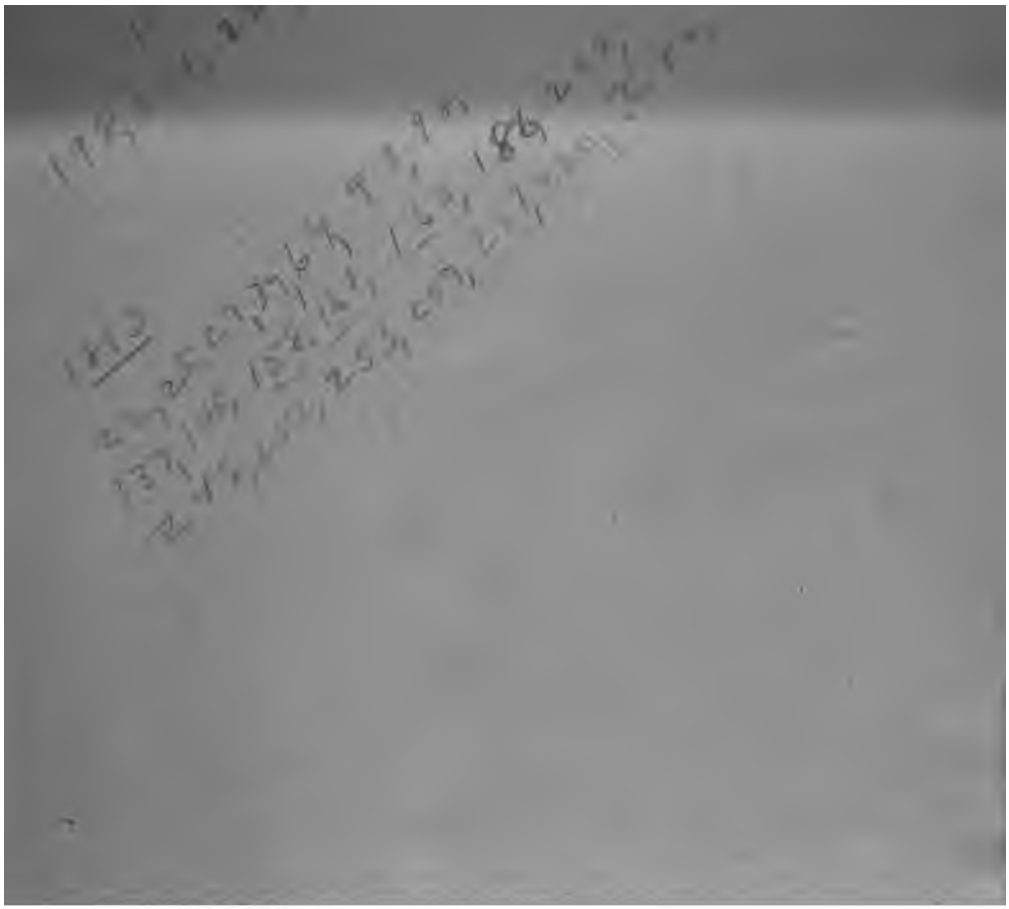

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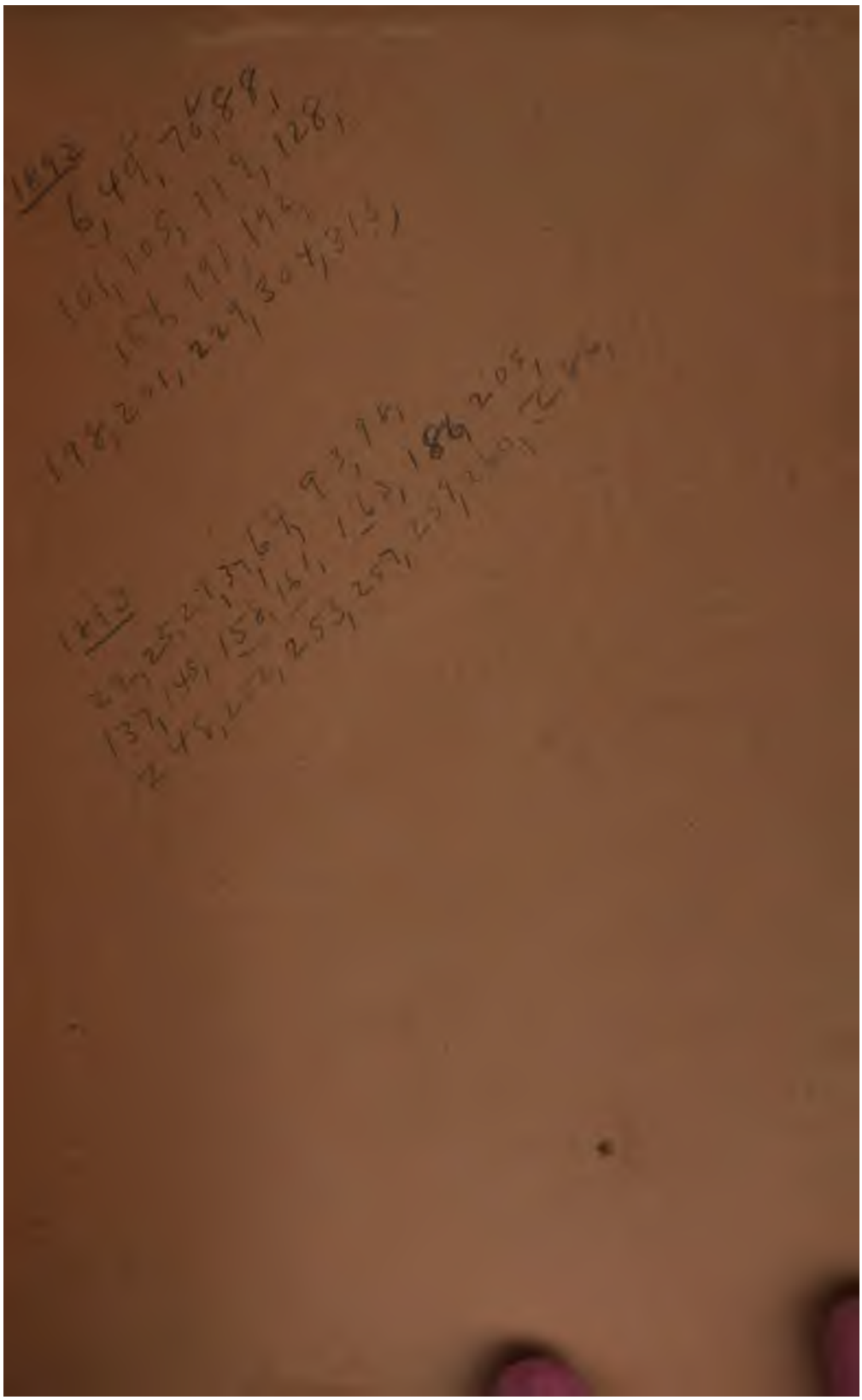

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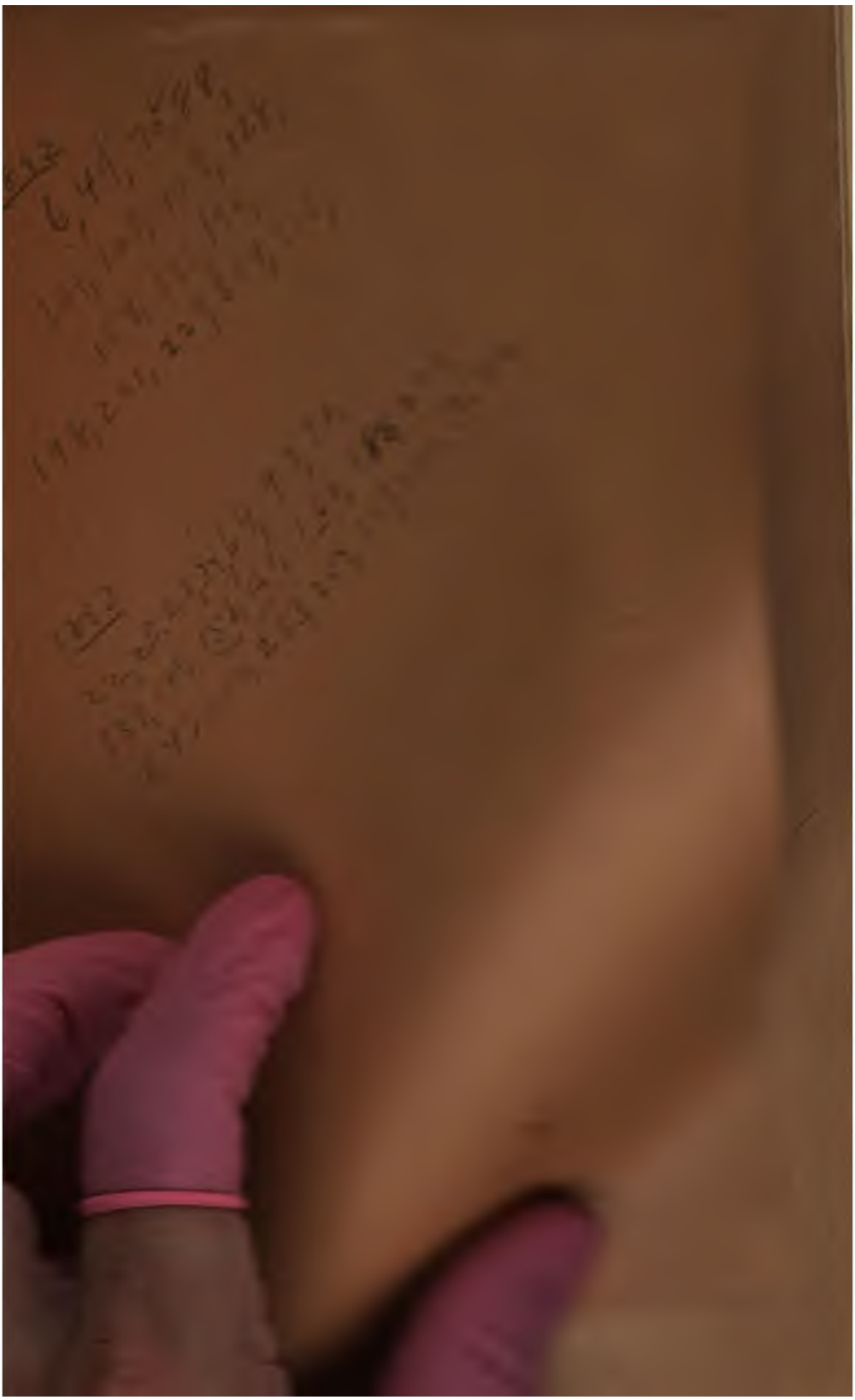

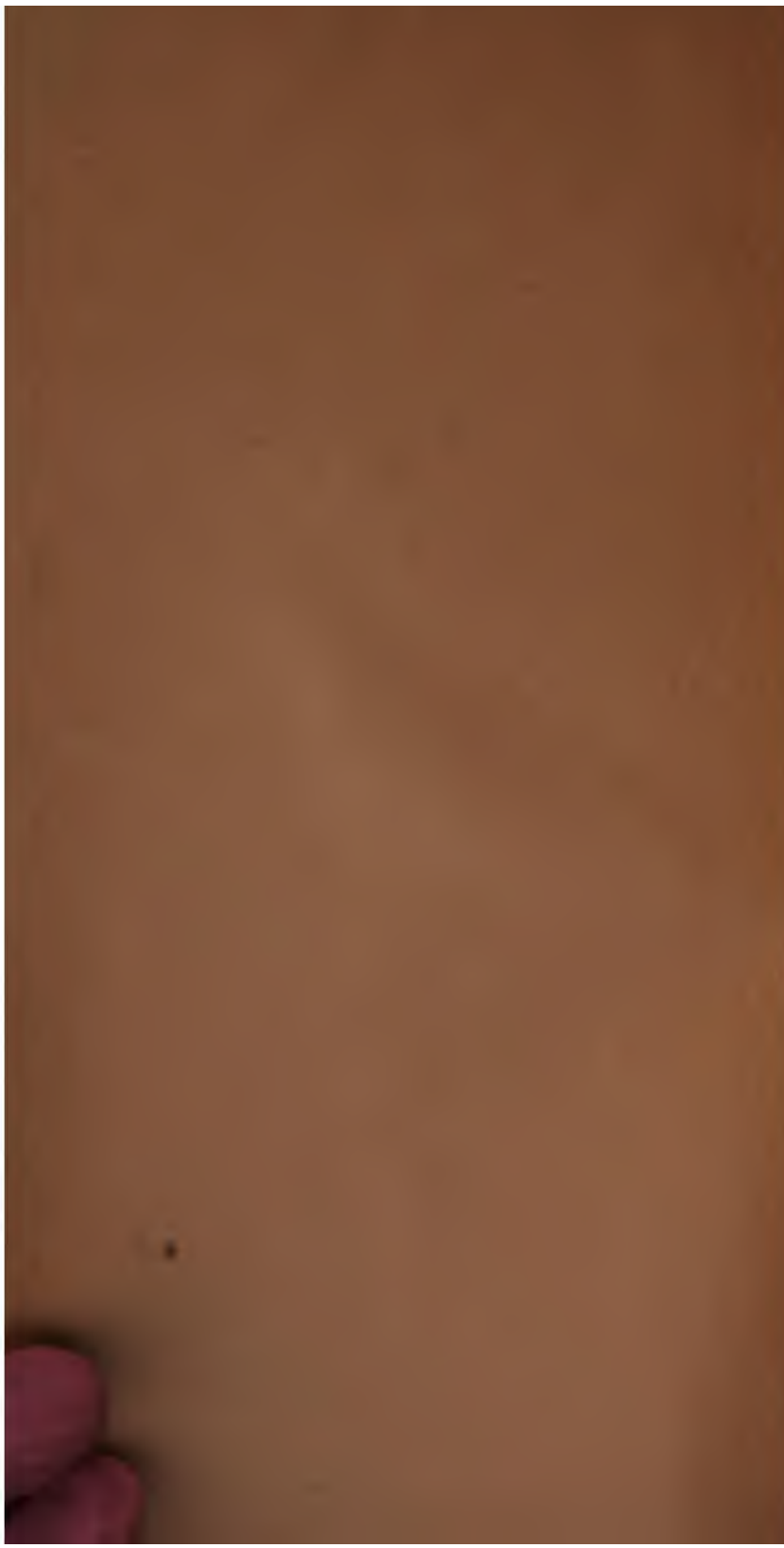

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CAN INSECTS SURVIVE FREEZING?*

BY H. H. LYMAN, MONTREAL.

In a foot note to his paper on "The Butterflies of Laggan" (CAN. ENT., XXII., 129), Mr. Bean says: "I hope none of my younger readers entertain the absurd mediæval superstition that hibernating caterpillars pass the winter in a *frozen condition*. In successful hibernation they do not get near to such a condition; but if they do absolutely freeze, then are they undone caterpillars. Valkyria gives them sleep, unmixed with dreams, and they wake in Valhalla."

Without entering into any discussion as to my relative age in comparison with Mr. Bean's, I may confess that I have long believed that *some* caterpillars, as well as insects in other stages, can and do survive freezing. And, finding my belief so distinctly challenged, I have endeavored to find some light upon this subject from such literature as is accessible to me, and from personal testimony.

The first work to which I turned was Scudder's "Butterflies of New England".

In this work there is an Excursus, No. XVII., on "Lethargy in Caterpillars", and another, No. XXII., on "The Hibernation of Caterpillars," but in neither is any light thrown upon this question.

In the same author's "Butterflies" but little more is said upon this subject. On page 135, in writing of *Colias philodice*, he says: "Winter overtakes at once caterpillars of various ages, chrysalids and butterflies, and probably eggs. The experience of breeders, and the diversity in the time of appearance of the butterflies in the spring, render it probable that the cold season kills not only the butterflies and eggs, but perhaps the chrysalids as well, leaving the caterpillars to renew the life of the species in the spring."

* Read before the Annual Meeting of the Entomological Society of Ontario, November 25th, 1891.

But, though I have failed to gather from his works any information upon this subject, I have learned from him personally, and by letter, some facts which may be thought to throw some light upon this question. About thirty-five years ago Mr. Scudder was prodding for beetles in some hole of a rotten stump in winter at Williamstown, Mass., and came across several caterpillars of Isabella, and breaking at least one in two found it brittle, like an icicle, and he believes he noticed crystals within, and, therefore took two or three home to his room to see if they would come to life, which one or more did. Mr. Scudder, however, does not lay much weight on these facts, and adds: "I may or may not have broken more than one, and do not at all remember whether only one or all came to life, but of course I *may* have broken only one, and that one already dead."

I have recently seen somewhere, where I cannot now say, though I have spent hours in searching for the reference, an account of a caterpillar being found frozen into a cake of ice. The finder cut out a cube of the ice containing the caterpillar by means of a red-hot poker, and then left the block on the sill outside his window for several days, while the temperature ranged below zero. Upon bringing it into the house and thawing out the larva, it revived, and became quite active, but further experiment was prevented by its spinning its cocoon.

In Mr. Fletcher's report for 1889 (Experimental Farm Reports, 1889, p. 79), it is recorded that four larvæ of the Mediterranean Flour Moth (*Ephestia Kühniella*, Zeller) were placed in a glass vial out of doors for half an hour when the temperature was only five degrees above zero F., and as a result were frozen hard, so that they "rattled like glass beads against the sides of the bottle". Of the four, two never recovered at all, but the other two revived partially and retained their natural appearance for about a fortnight, and moved their bodies a little, though they finally succumbed. The Rev. T. W. Fyles has kindly given me the following particulars of his experience with larvæ of Coleoptera: "In the winter of 1864–5, I was splitting up decaying hemlock logs in my pasture at Iron Hill, P. Q., intending to burn them in the spring. On several occasions I found in these logs numbers of the larvæ of *Orthosoma unicolor* in a torpid state. In some cases the water had percolated into the burrows of the insects and frozen around their occupants. One day I picked out a number of the largest grubs from their icy envelopments, and found them rigid and seemingly lifeless. I took them to my house and watched them as they slowly thawed into activity."

Dr. John Hamilton, of Alleghany, Pa., on the other hand, found, as related in his interesting paper in CAN. ENT., XVII., p. 35, that he could not revive specimens of Coleoptera which were unquestionably frozen, though some larvæ inclosed in cylinders of ice were still found to be flexible, and regained activity on a rise of temperature.

Though Dr. Hamilton's experience was decidedly against the theory that actual freezing does not necessarily cause death in insects, he still admits that a good deal of evidence has been adduced on the other side, and that records of the survival of frozen insects cannot be summarily dismissed.

To turn to some of the older writers on entomology, I may quote the following from Kirby & Spence's "Introduction to Entomology", Vol. II., second edition. On page 231, after referring to some very extraordinary instances of the survival of insects under such trying circumstances as immersion in gin for twenty-four hours, and immersion in boiling water, the authors say: "Other insects are as remarkable for bearing any degree of cold. Some gnats that De Geer observed survived after the water in which they were was frozen into a solid mass of ice: and Reaumer relates many similar instances." Later, on pages 452–3 of the same volume, in treating of "Hibernation of Insects" I find the following very interesting remarks: "But, though many larvæ and pupæ are able to resist a great degree of cold, when it increases to a certain extent they yield to its intensity and become solid masses of ice. In this state we should think it impossible that they should ever revive. That an animal whose juices, muscles and whole body have been subjected to a process which splits bomb shells, and converted into an icy mass that may be snapped asunder like a piece of glass, should ever recover its vital powers, seems at first view little less than a miracle; and, if the reviviscency of the wheel animal *(Vortricella rotatoria)* and of snails, etc., after years of desiccation, had not made us familiar with similar prodigies, might have been pronounced impossible; and it is probable that many insects when thus frozen never do revive. Of the fact, however, as to several species, there is no doubt. It was first noticed by Lister, who relates that he had found caterpillars so frozen that when dropped into a glass they clinked like stones, which nevertheless revived. Reaumer, indeed, repeated this experiment without success, and found that when the larvæ of *Bombyx pityocampa*, F., were frozen into ice by a cold of 15° R. below zero (2° F. below zero), they could not be made

to revive. But other trials have fully confirmed Lister's observations. My friend, Mr. Stickney, the author of a valuable 'Essay on the Grub' (larva of *Tipula oleracea*)—to ascertain the effect of cold in destroying this insect, exposed some of them to a severe frost, which congealed them into perfect masses of ice. When broken their whole interior was found to be frozen; yet several of these resumed their active powers. Bonnet had precisely the same result with the pupæ of *Papilio brassicæ*, which, by exposing to a frost of 14° R. below zero (0° F.), became lumps of ice, and yet produced butterflies. Indeed, the circumstance that animals of a much more complex organization than insects, namely, serpents and fishes, have been known to revive after being frozen, is sufficient to dispel any doubts on this head."

In Burmeister's "Manual of Entomology" the above instances are also referred to, though at much less length; but, as no additional facts are adduced, it is unnecessary to quote from his work.

The above would seem sufficient to establish the proposition that some insects can survive freezing, and, indeed, when one remembers that insects successfully maintain their existence in the most arctic lands which have ever been visited by man, it seems strange that anyone should ever have questioned it. Is it conceivable that these tiny creatures, when in a state of lethargy and partaking of no nourishment, could successfully resist yielding to frost in regions subject to a temperature of 75° F. below zero, and where in summer the soil only thaws to the depth of twelve or fifteen inches, the ground below this depth being perpetually frozen?

The meteorological tables of the English arctic expedition of 1875–6 show that the mean temperature of the winter months at the stations of the two vessels, "Alert" and "Discovery", varied from 5° F. below zero in October, and 17° F. below zero in April, to 40° F. below zero in the middle of the winter, and that the minimum temperatures reached were:—73¾° F. at the winter quarters of the first named vessel, and —70.8° F. at the station of the latter in Discovery Bay.

In spite of these terrible temperatures the naturalists attached to the expedition were very successful, and Mr. Robert McLachlan, F. R. S., to whom the collections of insects were submitted, wrote as follows in his

report: "The materials brought home from between the parallels 78° and 83° N. latitude, showed quite unexpected, and in some respects astonishing results. I have no hesitation in saying that the most valuable of all the zoological collections are those belonging to the entomological section, because these latter prove the existence of a comparatively rich insect fauna, and even of several species of showy butterflies, in very high latitudes."

But the most interesting account of experiments on this subject which I have seen, is that given by Commander James Ross, R. N., F. R. S., and inserted by Curtis in the Entomological Appendix to the "Narrative" of Sir John Ross's second arctic voyage. The experiments were tried upon the caterpillars of *Laria Rossii*, a very abundant species in Boothia Felix, and doubtless all through the artic regions of this continent. The account (page lxxi.) is as follows: "About thirty of the caterpillars were put into a box in the middle of September, and after being exposed to the severe winter temperature of the next three months, they were brought into a warm cabin, where, in less than two hours, everyone of them returned to life, and continued for a whole day walking about; they were again exposed to the air at a temperature of about 40° below zero, and became immediately hard frozen; in this state they remained a week, and on being brought again into the cabin, only twenty-three came to life; these were, at the end of four hours, put out once more into the air, and again hard frozen; after another week they were brought in, when only eleven were restored to life; a fourth time they were exposed to the winter temperature, and only two returned to life on being again brought into the cabin; these two survived the winter, and in May an imperfect *Laria* was produced from one, and six flies from the other."

That a caterpillar infested with parasites should have been able to survive such severe treatment and spin its cocoon is most remarkable, and it is not to be wondered at that alternate freezing and thawing should have been disastrous to the majority of those experimented upon. Many other similar accounts doubtless exist, but I think that the records which I have thus brought together are sufficient to prove that actual freezing is not necessarily fatal to insects, and that Mr. Bean had no sufficient warrant for the statement quoted at the beginning of this article.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE (V.), AND THE LIFE HISTORY OF CALLIDRYAS EUBULE.

BY HARRISON G. DYAR.

Pyrameis cardui, Linn.

The life history of this well-known species has not been written, to judge from the references given by the late Mr. Henry Edwards in his useful catalogue, so I present it here ;—

Egg.—Cylindric-conical, the base flat with the usual vertical ribs ; colour pale yellow ; diameter .6 mm. Laid singly.

First larval stage.—Head rounded, black and shining ; width .3 mm. Cervical shield and anal plate black ; body very blackish with a number of short dark hairs ; feet normal. The larva lives under a slight web on surface of leaf.

Second stage.—Head as before with a few hairs ; width .6 mm. Body dull black, furnished with rows of short conical blackish tubercles each with a long hair ; the tubercles of the rows (1) and (2) on joints 6, 8 and 10 are pale yellow. Hair blackish ; feet black.

Third stage.—Head slightly bilobed, black, shining, a few black hairs from minute tubercles ; width 1.1 mm. Body black, covered with spined processes arranged as in *Grapta**, all black except the three dorsal ones on joints 6, 8 and 10 which are yellow, but with black spines.

Fourth stage.—Head bilobed, uniform shining black, with many black hairs arising from elevated bases ; width 1.9 mm. Body black, minutely dotted with yellow ; processes black except the bases of the three dorsal ones on joints 6, 8 and 10, which are dark yellow. As the stage advances a very narrow geminate dorsal and single subventral broken yellow line appears. The larvæ live singly under nets constructed of silk supported on a leaf.

Fifth stage.—Head rounded, uniform sublustrous black, the mouth parts paler and bases of antennæ reddish ; covered with black hairs of considerable length, which arise from small tubercles ; width 3.5 mm. Body deep black, brownish subventrally and on the legs, with numerous minute yellow piliferous tubercles bearing whitish hairs. The shafts of the processes are all more or less colourless, but the branches and tips are all black and the bases are shining blue-black. There is a row of inter-

* See "Descriptions of some Butterfly larvæ from Yosemite," No. VI.

segmental stigmatal red dots and a similar row of larger substigmatal yellow dots. Claspers of abdominal feet pale. In some examples the substigmatal yellow dashes almost form a continuous band, and there are indications of a geminate yellowish dorsal line; but this latter marking almost disappears under a lens.

Chrysalis.—Head large, eyes prominent, thorax very slightly ridged along the dorsal line with an elevated point posteriorly centrally and a pair of smaller subdorsal points, two points on the lateral edge of wing cases and one near the middle of outer margin of wing. Abdomen rounded dorsally, nearly straight ventrally, with a subdorsal row of conical points; cremaster broad and flat, colour sordid white with an obscure golden tint, dotted with black and shaded with smoky gray, broadly so dorsally (except a narrow dorsal line), narrowly stigmatally, broadly ventrally, and more irregularly and clouded over the thorax and cases. All the points tinged with shining gold or bronze. Length 13 mm.; width 6 mm.

Food-plants.—Lupine *(Lupinus)* and thistle *(Carduus).*

Callidryas eubule, Linn.

Egg.—Spindle shaped, truncated on basal end, distinctly vertically ribbed and faintly transversely striated. Colour pale white, becoming ochre yellow before hatching. Length 1 mm.; diameter .3 mm.

First larval stage.—Head round, smooth, ochre yellow, the ocelli dark brown; width .3 mm. Body smooth, concolorous with head, with a number of long tapering setae, curving forward, about six on each joint.

Second stage.—Head rounded, subtranslucent yellowish; width .5 mm. Body cylindrical, pale yellow, with many short hairs arising from granulations of considerable size. Some of these hairs overhang the head and many terminate in a little knob. Under the microscope the setae are seen to be all glandular, transparent and swollen at tip, and arise from large conical tubercles, between which the body is very minutely punctured.

Third stage.—Head pale green, mouth parts yellowish, many short pale setae; width .8 mm. Body annulated, about six annulets per segment. Colour yellowish green, not shiny, with a distinct rather broad, pale green stigmatal line. The fleshy tubercles on the body are slight, the setae very short but slightly blackish and bear at tip large, round, clear liquid drops.

Fourth stage.—Head round, leaf green, mouth parts yellow; many short hairs arising from black conical granulations; width 1.5 mm. Body leaf green with a paler stigmatal line and thickly covered with black conical granulations, some of which are larger than others and surrounded by pale green, and all bear short setae. Under the microscope these granulations are seen to arise from swollen green bases and the setae each terminate in a clear spherical drop.

Fifth stage.—Head small in comparison with body, round, leaf green, thickly covered with conical granulations bearing minute setae, concolorous with head, but a few of the larger ones are blue-black; width 2.4 mm. Body cylindrical, 5 mm. thick, dark leaf green with a distinct rather broad, yellow stigmatal line strongly shaded with orange, extending the whole length of the body and bordering the anal plate. Six annulets per segment, each annulet containing some twelve conical blue-black granulations, surrounded by bluish green at the base. Only a few of these occur below the stigmatal line and then in the middle of the joints where, also, just above the stigmatal line, and sometimes partly below it, the granulations are connected by black, forming incipient transverse bands on the annulets. The granulations are each tipped by a short black seta. Feet and venter pale green, nearly smooth. The body is very minutely punctured between the granulations when seen under the microscope.

Chrysalis.—Suspended by the cremaster and a long very slight silken loop. Thorax bent up at an angle of 45° with the body, rounded, a slight depression posterior to it; a long pointed process on the head like a horn, almost continuous with the sides of the body. Wing cases enormously, developed, projecting more than the thickness of the body, evenly rounded along ventral line, flattened laterally and tapering ventrally to an edge. Abdomen cylindrical, tapering; cremaster flattened, a little excavated below. Colour dark pinkish vinaceous†, or pea-green‡, with a greenish dorsal and lateral band, bordered with pale yellow; ventral line and veins of wing-cases narrowly yellowish. Length 25 mm.; thickness through wing cases from dorsum to venter 10 mm.; thickness of abdomen posterior to cases 4 mm.; width of body 5 mm.

Food-plant.—Senna *(Cassia.)*

Larvæ from Santa Barbara, Cal.

† Ridgway's Nomenclature of Colours, pl. iv., fig. 18.

‡ Op. Cit., pl. x., fig. 9.

REVISION OF THE BOMBYLID GENUS EPACMUS (LEPTOCHILUS).

BY D. W. COQUILLETT, LOS ANGELES, CAL.

In the CANADIAN ENTOMOLOGIST for May, 1886, I gave descriptions of the only two species of *Leptochilus* at that time known to inhabit North America. I am not aware that any additional species have been described since the appearance of that paper. My collection contains representatives of three as yet undescribed species which will be found duly characterized below.

In the *Biologia Centrali Americana*, Part Diptera, the Baron Osten Sacken calls attention to the fact that the name *Leptochilus*, first applied to this genus by Dr. Loew, is preoccupied, and proposes the name *Epacmus* to be used in its stead. It is to be regretted that the rules of nomenclature will not permit us to attach Dr. Loew's name to this new term; the genus is rightfully his from the fact that he first characterized it after an extended search among the writings of other authors, and it seems hardly fair to deprive him of this honour simply because he inadvertently applied to it a name already in use. Perhaps we might compromise matters somewhat by writing the name of this genus: *Epacmus* Osten Sacken-Loew, which would indicate a joint work of these two authors.

Following is a table of the species of *Epacmus* known to me to occur in North America:

1. Ground colour of the abdomen black 2
   Ground colour of the abdomen yellow, its tomentum golden-yellow except a white crossband on the second segment . *concinnus*, n. sp.
2. Wings (except sometimes the costal and subcostal cells) wholly hyaline, front and face furnished with tomentum . . . 3
   Wings smoky-brown at the base, front and face destitute of tomentum 4
3. Scutellum shallowly concave behind, hind and middle femora and front tibiæ provided with bristles . . *modestus*, Lw.
   Scutellum convex behind, all femora and the front tibiæ destitute of bristles . . . . . *pellucidus*, n. sp.
4. Hind femora and front tibiæ provided with bristles, scutellum polished black . . . . . *transitus*, Coq.
   Hind femora and front tibiæ destitute of bristles, scutellum opaque *fumosus*, n. sp.

Epacmus concinnus, n. sp.—Head black, front densely white pollinose, destitute of tomentum, the middle portion sparse white pilose, the orbits and space in centre of lower third of front bare; face much retreating below, densely white pollinose, destitute of tomentum, the lower three-fourths densely white pilose. Proboscis not projecting beyond the oral margin. Antennæ having the first two joints yellow, the third black and nearly twice as long as the first two united; styliform portion of the third joint one-half as long as the thickened basal part. Occiput yellowish tomentose. Thorax black, the anterior third white tomentose, the remainder yellowish tomentose; pile of thorax sparse and mostly yellowish, the bristles also yellowish; pleura dense white tomentose and sparse yellowish pilose. Scutellum opaque black, rounded behind, white and yellowish tomentose, the bristles yellowish. Abdomen reddish-yellow, its tomentum and pile golden-yellow except a wide crossband of white tomentum on the second segment; venter yellow, blackish at its base, its pile and tomentum yellowish except that at the base, which is white. Legs yellow, a black spot at base of each trochanter; tomentum and bristles of legs yellowish, hind femora each with three bristles below, ront tibiæ provided with bristles. Wings wholly hyaline. Stalk of halteres brownish-yellow, the knob sulphur yellow. Length 7 mm. San Diego county, Cal. A single female, in May.

Epacmus pellucidus, n. sp.—Black, the femora, tibiæ and base of each tarsus reddish. Front densely dark brown and yellowish-white tomentose and pilose, the pile very short; face slightly produced below, white tomentose and yellow pilose. Proboscis not projecting beyond the oral margin. Antennæ having the second joint minute and scarcely apparent; styliform portion of the third joint equal in length to the thickened basal part. Occiput white tomentose, that in the middle above reddish-brown. Thorax reddish tomentose, the bristles white (only two in number, one in front of each wing); pile and tomentum of the pleura, breast and coxæ white. Scutellum opaque, rounded behind, reddish tomentose, the pile and bristles wholly wanting. Abdomen mixed reddish and yellowish tomentose, that on the last two segments wholly white; last segment polished black, the pile on its apex golden yellow; dorsum nearly destitute of pile, first segment toward its sides abundant white pilose; venter yellowish-white tomentose. Legs white tomentose, all femora and the front tibiæ destitute of bristles. Wings hyaline, apex of subcostal cell

yellowish. Stalk of halteres dark yellow, the knob light yellowish. Length 6 mm. Los Angeles county, Cal. A single female, in June.

Epacmus fumosus, n. sp.—Black, the tibiæ largely reddish. Front black pilose, destitute of tomentum; face slightly produced below, destitute of tomentum, the pile yellow, that in the middle black. Proboscis not projecting beyond the oral margin. Antennæ having first joint twice as long as the second, styliform portion of the third joint once and a-half as long as the thickened basal part. Occiput light yellow tomentose and pilose. Thorax light yellow tomentose, the bristles yellowish; pleura having pile of the upper part yellowish, that on the lower part, breast and coxæ white. Scutellum opaque, rounded behind, yellow tomentose, the bristles reddish. Abdomen somewhat abraded in my specimen, but apparently wholly light yellow tomentose; pile of dorsum sparse, yellowish, that on the sides more abundant, especially on the first segment, white; venter white tomentose and pilose. Legs mixed white and yellow tomentose, all femora and the front tibiæ destitute of bristles. Wings hyaline at the apex, the costal cell, bases of marginal, first submarginal, first and second basal and of the anal cell smoky-brown, which colour does not have a well defined limit outwardly. Stalk of halteres dark yellow, the knob light yellow. Length 6 mm. San Diego county, Cal. A single female, in May.

HETÆRINA AMERICANA.

There was brought to me by Mr. T. H. Hill, of this city, one of our young collectors, a dragon fly captured at Delaware, a village a few miles west of here. It was one I had not seen before. On referring to Glover's Plates I found it there, figured and named. It is *Hetærina Americana*, Fab., the *Lestes basalis* of Say, in the family Agrionidæ; a beautiful creature. Its most noticeable characteristics are the bright sanguineous colour on the base of the wings, the clear copper colour of the thorax, and the brilliant gem-like ornamentation of the head. Say gives the habitats as Missouri, Indiana and Massachusetts. Abundant, and easily taken. I am not aware of its being hitherto reported from Canada. Mr. Hill kindly donated one to the Society's collection.

J. Alston Moffat, London, Ont.

CANADIAN GALLS AND THEIR OCCUPANTS—AULAX NABALI, N. S.

BY WM. BRODIE, TORONTO.

Gall at the base of the stem of *Nabalus altissimus*, usually in masses surrounding stem, often extending down on main root, rarely on main fibres of root, usually about an inch under the ground. sometimes partly above the ground. Galls roughly spherical, 5 mm–10 mm in diameter, each containing 1-10 cells, usually aggregated in irregular cylindrical masses of 2-14, resembling small knobby artichokes or irregular small white potatoes. The interior of the gall has the appearance and consistence of a raw potato. They are mature about the middle of September, and retain their white appearance through winter, but in spring the colour darkens. They dry up when the interior presents the appearance of a congeries of corky, fibrous folds. The average size of 20 of the cylindrical gall masses was, diameter, 14xx; length, 22xx. The cells are small, closely confining the larva.

In the spring of 1880 a friend handed me one of these galls, and informed me he had found it on the stem of an aster. For several seasons I carefully searched our asters, but failed in finding the gall, and it was not until the spring of 1885 when I found it on the root of *Nabalus altissimus*. My friend had mistaken the nude, dry stem of the nabalus for an aster.

In April, 1887, I made a collection of 33 gall masses from *Nabalus altissimus* growing on clay banks in open woods in St. James's Cemetery, Toronto.

The galls were at the base of the stem, immediately above root. Usually the mass of galls surrounded the stem; occasionally but a few on one side. From these galls I reared 115 producers—79 ♀s, 36 ♂s, and 57 parasites, ♂s and ♀s, of two species.

The producers came out 1-6-87—9-6-87; the parasites were a few days later.

A collection was made from *Nabalus* roots growing on clay soil in open woods a few miles north of Toronto, 20-10-88, and kept in a glass jar over winter. These galls were nearly spherical, 5x-10x dia., usually grown together in masses of 2-14, usually quite surrounding the stem, each nodule having from 1-10 cells.

These gave producers 17-5-89—28 5-89; parasites 21-5-89—1-6-89.

A collection of 71 gall masses made in Taylor's woods north of Toronto, 13-9-90, resembled artichokes or small white potatoes; the interior white, about the consistency of raw potato. Each nodule contained from 1-3 cells; cells small, closely confining larva.

These gave producers 13-5-91—20-5-91; parasites 19-5-91—1-6-91. ♀ producers were more numerous than ♂s.

A collection made from several localities near Toronto from stems of *Nabalus altissimus* growing on clay soil in open woods, 5-4-91, of 87 nabalus stems gathered 68 were gall bearing. The galls, as usual, a mass of rounded nodules surrounding base of stem an inch or two under ground; occasionally a few nodules on one side of stem, rarely a few nodules extend into pith canal.

These gave parasites, *Eurytoma*, 5-5-91; producers first out 12-5-91; producers, 29 ♀s and 5 ♂s; out, 25-5-91; numerous parasites 9-6-91—25-6-91. One *Eurytoma* 22-7-91.

This lot of 68 gall masses containing probably 1,000 cells, gave of producers 153 ♀s and 81 ♂s, and of parasites, of 3 species, 185 ♂s and ♀s, a total of 419 specimens.

When collected in the fall season these galls may be kept in moist sand in a glass jar, but the occupants seem to be hardy, and do not appear to be injured by the drying of the gall. However, it is best to collect in April or early in May.

These galls have been increasing during the last ten years, and have now probably reached a maximum. The parasites are now becoming more numerous. The producer is held to be an undescribed species of *Aulax*, for which I propose the name *A. nabali.*

The following is a description:—

♀. Length 2.50xx. Antennæ 13 jointed, uniform brown, head and thorax black, abdomen shining brown, with a large anterior dorsal spot black; all the tibiæ, femora and tarsi brown, a little paler than the abdomen; wings ample, veins well defined, hyaline, irridescent at certain angles.

Abdomen of ♂ darker brown, and without the dark dorsal spot. From numerous specimens.

I have bred from this gall numerous specimens of the Braconid *Dacnusa crassitela*, Prov.

Provancher in his original description of this species gives Ottawa as the locality and Guignard as the collector. He does not say how the

specimen was obtained, nor does he say anything of the ♂, which differs considerably from the ♀.

I have also bred numerous specimens of the Chalcid *Eurytoma aulacis*, Ashm.; and I have reared two species of Coleoptera, probably accidental occupants, and many specimens of a Dipteron which Prof. Riley has kindly determined for me as of the genus Leucopis, sp. I am greatly indebted to the courtesy of Prof. Riley for this and many other identifications.

ENTOMOLOGY FOR BEGINNERS—No. 1.

NOTES ON KILLING, PRESERVING AND RELAXING INSECTS.

BY JAMES FLETCHER, OTTAWA.

The editor informs me that he wishes to publish in this year's volume of the CANADIAN ENTOMOLOGIST several short articles for the benefit of beginners and many others, who, although they do not aspire to being considered entomologists, yet would like to know something about our common insects, and the best way to preserve such interesting specimens as may chance to come in their way, until they may have an opportunity of mounting them for their own collections or giving them to interested friends. I have been asked to send some notes on the above subject.

There is perhaps no statement more frequently made to entomologists by observant travellers, or those who live in localities far removed from civilization, than "Oh! I wish you had been with me, I so often saw lovely insects; but I did not know how to save them for you." From novices the enquiry often comes, "What is the best way to relax specimens after they have become dry."

Killing and Preserving.—Having collected a specimen the first thing, of course, is to kill it. For beetles and hard-bodied insects nothing is simpler than to drop them for a second or two into scalding water; they must be taken out again at once and dried on blotting paper, or upon a cloth. The easiest way, however, for killing all insects is to make a "cyanide bottle." This may be made either by placing a small quantity of cyanide of potassium in the bottom of a wide-mouthed bottle and pouring in sufficient wet plaster-of-paris to cover it; or a hole can be hollowed out in the cork and a piece of cyanide inserted. This can be kept in place either with a plug of cotton wool, or a piece of chamois

leather or linen may be tied over the cork. It must be remembered that the active principle of cyanide of potassium being prussic acid it is intensely poisonous—any left on hand after the bottle is made should be at once destroyed.

Insects put in this bottle will be killed in a few seconds by the poisonous fumes given off by the cyanide of potassium; they should then be taken out and packed away whilst soft and pliable. After a few days they become dry and are very easily broken. If there are only one or two specimens these may be wrapped in soft paper or cotton wool, and put away in a suitable box. If the collector, however, is likely to get several specimens, it will be well to prepare a box or bottle on purpose. Beetles or bugs may be preserved for a long time in clean saw-dust dampened with alcohol; grasshoppers, ants, wasps, bees, flies, etc., although they are far better preserved by being pinned at once after killing, may be packed away like beetles and bugs in tubes of paper. These are made by winding two or three thicknesses of a strip of paper 1½ inches wide around a lead pencil, leaving about one-quarter inch over the end, which is turned in and pressed flat before taking the case off the pencil. Into this short, hollow tube drop the specimens and turn in the other end with the tip of a pencil, or fill up the mouth with a plug of cotton wool. Several specimens, according to their size, may be placed in each tube, and the date and locality having been written on the outside they are ready to be packed away in a dry place. Being slightly elastic and very light they pack closely, and a large number can be sent by mail at the same time.

Moths, butterflies and dragon-flies may be killed in the ordinary "cyanide bottle," and then placed in three-cornered envelopes made by taking small squares of paper and folding them across, almost in the middle, so as to make a triangular form with one flap a little smaller than the other, when the insect is placed between the two flaps, the two edges of the larger one are folded over the lesser, and the specimen is then ready to have the date and locality written on it and to be packed away where it will not be disturbed.

Relaxing.—The easiest way to soften insects is simply to place them in a covered jar upon damp sand for from 12 to 24 hours. A few drops of camphorated spirits dropped on the sand will prevent mould from forming on the specimens. Pinned specimens can be either placed in the sand jar or pinned upon a piece of cork and floated on water in a closed

jar, or in a basin with a damp towel over the top. Butterflies and moths stored in the envelopes mentioned above are best relaxed by putting the envelopes carefully without opening them, between the folds of a damp towel placed between two sheets of glass. The cloth should be wetted and then wrung out as dry as possible with the hands. Fold it smoothly and spread out the envelopes separately between the folds. Small butterflies and moths will relax in 12 hours and the largest in 24 hours. Beetles and bugs in paper tubes may be dropped into warm water and will be ready for setting in a few minutes ; wasps, bees and flies should be placed in the sand jar to soften. Mr. W. H. Harrington, who uses these tubes extensively for all kinds of insects, finds that specimens can be conveniently relaxed by putting the tubes on a piece of wet blotting paper in the bottom of one saucer with another inverted over the top. The advantage of this plan is that if specimens should be accidentally forgotten, or it should be inconvenient to mount them at once, the small amount of moisture soon evaporates, and there is no danger of mould.

"BUTTERFLIES THAT BATHE."

In Goldthwaite's Geogl. Mag., Vol. 2, p. 738 (Nov., 1891), is a paper on "Butterflies that Bathe", giving observations of M. G. Lyell, jr., in Australia, on certain butterflies, species not stated, that "backed into the water until the whole of the body and the lower part of the hind legs were under water, the two forelegs only retaining their hold on dry land. After remaining in this position something like half a minute it flies away, apparently refreshed. During the morning I noticed a number doing the same thing. In one instance no less than four were to be seen within a space of not more than three yards * * *. While in the water the fluttering of the wings was suspended, and so intent were the butterflies in the enjoyment of the cold bath that they could hardly move, even when actually touched by the net * * *. Immediately upon emerging they flew up again to the hill sides." I do not know where this was originally published. Mr. W. G. Wright sent me the copy of the Geog. Mag., and remarked that it was a case of depositing eggs on plants in the water, and that the larvæ must be aquatic in their habits. I think there can be no doubt of that. Further observations on this butterfly would be welcome, and lepidopterists would be glad to know what genus and species has so unusual a habit.

W. H. Edwards, Coalburgh, W. Va.

AN EXPLANATION.

On the Report of the Entomological Club, as given in the CANADIAN ENTOMOLOGIST for November, pp. 246-247, I would make the following remarks :—

Mr. Smith's statement that there are two distinct series in the *Sphingidæ*, as also that the *Smerinthinæ* have their probable orgin in Ceratocampid forms of the *Bombycidæ* are both original with myself. The series *Hemaris*, *Choerocampa* and *Smerinthus* belong together. So far as I know, I am the first to show, from imaginal and larval characters, that *Choerocampa* and *Smerinthus* are allied, and I am the first to describe an ocellated Choerocampid from Brazil. The anal horn of the *Sphingidæ* is to be regarded apparently as the last remnant of the *Bombycid* dorsal series of thorns. So far as known to me, I am the first author to point out that older Lepidopterous types occur in America than in Europe, and that from the study of our *Bombycid* fauna fresh suggestions are offered to the probable course of evolution in the order.

To the statement as to the *Zygaenidæ*, p. 246, I would say that I followed Dr. Packard's views in his paper in the Essex Proceedings. Criticisms as to my arrangement in my Lists are sufficiently answered by this statement.

To the remark upon the *Dioptidæ*, p. 247, I would state that I am not " responsible " for the reference of *Phryganidia Californica* to this family, but Mr. Butler, whose reference will be found in the pages of " Papilio".

To the remarks on the *Noctuidæ*, I would state that I consider the group as one family with four unequal sub-family groups : *Thyatirinæ* m. (= *Thyatiridæ* m.), *Noctuinæ*, Pack., *Catocalinæ*, Pack., and *Deltoidinæ*, Lntr. I have shown in my writings that these groups are further divisable by sufficiently definable characters for classificatory purposes, and I have used the idea of tribes for these subdivisions in the Lecontean sense.

It is Mr. Smith's practice to take from my writings what he can use, without credit, and to hang upon minor points of difference, upon which I have nowhere insisted, criticisms which are generally uncalled for, and, as above instanced as to the *Dioptidæ*, sometimes incorrect.

A. R. GROTE, Bremen, Germany.

MELITÆA PHAETON.

About the first of July I was informed by Mr. W. E. Saunders that shortly before, when out on one of his Ornithological and Botanical excursions, he had seen *Melitæa phaeton*, in a cedar swamp, two miles from Komoka station, which is ten miles west of London, on the Grand Trunk line. I took the first favourable opportunity of getting a sight of that insect alive, which occurred on the ninth. I found the swamp, and soon saw the butterflies disporting themselves in the sunny spots, seemingly quite plentiful. They would not have been difficult to secure had the footing been solid, but a previous heavy rain had set that afloat. I took five, and saw quite as many more during the short stay I made in the woods.

J. ALSTON MOFFAT.

CORRESPONDENCE.

PETROPHORA SILACEATA.

Dear Sir: At our recent annual gathering the Rev. T. W. Fyles had brought with him a box of insects for the purpose of obtaining their names if he could. Amongst them was a Geometer, which I recognized as identical with one I have had for four years awaiting a name. When Captain Geddes arrived he also had another of the same kind amongst the material which he had brought. As no clue to its identity could be obtained from the authors we consulted, I thought the time had now arrived when we ought to know something about it, so I applied at headquarters for information, going into communication with the Rev. Geo. D. Hulst, who kindly returned my specimen with the name *Petrophora silaceata*, Hub. It proves to be an exceedingly interesting species, widespread and variable. Mr. Hulst mentioned that one of his specimens is from Labrador, sent to him by Moeschler. As I could not find the name in any of our N. A. catalogues, I turned to the European, and found it in Edward Newman's "Illustrated Natural History of British Moths" as *Cidaria silaceata*, Hub. It is therein illustrated by figures of six well defined varieties. Newman does not give any variety names, but Mr. Hulst determines my specimen to be "var. *deflavata*, Stdgr.," yet it is not identical with any of Newman's figures, although closely resembling the sixth, which is one of the least ornate. Newman says: "The moth appears in May, and a second brood in August, and is regarded as common in England, Scotland and Ireland."

London, Dec. 18th, 1891. J. ALSTON MOFFAT.

PROF. J. B. SMITH'S LIST OF LEPIDOPTERA.

BY G. H. FRENCH, CARBONDALE, ILL.

While I recognize the fact that each one of us has a right to make lists of insects to suit himself, and others are not obliged to follow them, errors of identity are not a matter of opinion, and are therefore subject to criticism. With this view I wish to point out a few errors in the genus *Catocala* in Prof. John B. Smith's new "List of Lepidoptera." First, var. *Virens*, French, is not a variety of *Cordelia*, Hy. Edw., but of *Amasia*; and *Cordelia* is not the one figured by Dr. Strecker, pl. 9, f. 12. My examples of *Cordelia* were identified by the author of the species. Second, there is no good reason for separating the two forms of *Retecta*. I have taken hundreds of them; they fly at the same time and behave alike in the woods, and grade into each other. *Flebilis* is not a variety of *Retecta*, but an insect of very different habits. Dr. Strecker's figure, so often referred to, pl. 9, f. 4, is not *Flebilis*, but a small form of *Desperata*. I had an example from Dr. Strecker, and have bred it from *Desperata* eggs. I cannot regard *Ulalume* as a variety of *Lacrymosa*, as they have very different habits in the woods, as well as the differences of size and markings that are seen in the insects in cabinets. I have taken all the named forms of *Lacrymosa*, as well as numerous intergrades; have taken quite a number of examples of *Ulalume*, but no intergrades with any form of *Lacrymosa*.

THE LARVA OF ANCERYX FASCIATA, SWAINS.

BY T. D. A. COCKERELL, KINGSTON, JAMAICA.

In July, 1891, Mr. I. I. Bowrey gave me a sphingid larva, about to pupate, which I described as follows:—

Larva.—Chœrocampa-like, ground colour pale ochreous, sides immaculate. Dorsal region (sharply defined from sides) dark, from a close, fine black marbling or mottling, which tends to run in anteroposterior lines. A band-like process of this marbling enters the side area on each segment, obliquely projecting towards, but hardly reaching the spiracle.

Underneath the larva is more or less mottled, and there is a narrow black ventral line. Abdominal legs dark. Thoracic legs rather pale. Anterior part of fourth segment above heavily marked with black. Head pale, with a dark brown band down each side of the face. Caudal horn small and pale.

Food-plant.—*Carica papaya*, Linn. (West Indian Papaw.)

Hab.—Kingston, Jamaica.

The imago emerged Aug. 7th, and proved to be *Anceryx fasciata*.

The present larva differs appreciably from that of *A. edwardsii*, Butl., as described by Mr. Hy. Edwards in *Entom. Amer.* III., p. 165. So far as the larval characters go, *Anceryx* and *Dilophonota* (whether regarded as two genera or one) seem to belong rather to the Chœrocampinœ than the Sphinginœ, with which they are placed in Prof. J. B. Smith's new list. The moths, also, while coloured like Sphinginœ, have a somewhat Chœrocampa-like build.

BOOK NOTICES.

INSECTS INJURIOUS TO FOREST AND SHADE TREES, by Alpheus S. Packard, M. D., Ph. D. (Fifth Report of the Entomological Commission of the United States). 1 vol., 8vo., pp. 957. Washington: Government Printing Office, 1890.

About ten years ago (in 1881) what was then called the United States Entomological Commission, consisting of Messrs. Riley, Packard and Thomas—three very eminent men—issued a work by Dr. Packard on "Insects Injurious to Forest and Shade Trees" (Bulletin No. 7), a goodly volume of 275 pages, well illustrated and replete with valuable information. Recently a revised and much enlarged edition of this publication has been issued by the Department of Agriculture at Washington, bringing the original work more nearly down to date, and furnishing, as far as possible, a complete manual on the subject. The new volume is more than three times the size of the former edition, consisting of no less than 950 pages, illustrated by over 300 wood cuts and forty plates, twelve of which are coloured. Some idea of the extent of the work, as well as of the importance of the subject, may be found from the fact that descriptions are given of over three hundred species of insects that affect the oak, and the names of nearly 150 more are mentioned; sixty-one are described as attacking the elm, and thirty more mentioned; one hundred and fifty-one described that affect the pine, and a list of twenty more given; and so on for a large number of other trees. Economic entomologists for the most part devote their attention to the insects that attack fruit trees, crops and vegetables, as these most directly affect the public; but surely no more important matter can be studied than the preservation of our forests, which are annually being depleted for the purposes of commerce, as well as by fire and insects. It is high time that more attention was paid to this matter, and that people generally should be aroused to the dangers that will surely result if we allow our country to be stripped of its woods and forests. In some countries of Europe, notably in Germany, a very rigid oversight of the forests is maintained by the government, and no wanton or careless destruction is permitted. In connection with this, they encourage scientific men to devote their studies to the insect enemies of trees, and as a result some magnificent books have been published, chief among these are the grand work of Ratzeburg and the perhaps less widely known publications of Kaltenbach. Alongside of these Dr. Packard's book will assuredly take its place, as his work is

very carefully and completely done. The life-history of each insect described is as far as possible fully given; the best published descriptions of each stage are quoted and references given wherever the author has not made personal observations himself, or whenever he thinks that someone else's record is better or fuller than his own. Thus the work is made complete to date, and succeeding observers will know what investigations have been made, and what remains to be done in this vast field of entomological research. The coloured plates are beautifully and accurately done, and the wood cuts and other illustrations give careful details or full representations of a large number of the insects referred to in the text. Such a publication ought to encourage our own Government to follow the noble example set them in this respect at Washington.

A Series of Thirty Coloured Diagrams of Insects Injurious to Farm Crops. Drawn from nature by Miss Georgiana E. Ormerod. W. & A. K. Johnston, London, England, 1891.

These diagrams are beautifully and accurately executed, and will be found most useful by any one who is called upon to lecture to classes in entomology, or give addresses to farmers' institutes. They are sufficiently large, being thirty inches long and twenty-two wide, to be seen at some distance in a hall or class-room, and will serve to illustrate descriptions of an economic character. Though intended for England, nearly all of them are equally applicable to this country. They are divided into five sets of six each, which deal with the following objects:—(1) Common Insect Attacks: Ox Warble Fly, Horse Bot-fly, Large White Butterfly, Cockchafer, Turnip Flea-beetle. Onion Fly; (2) Insects Affecting Various Kinds of Crops: Surface Caterpillars, Daddy Longlegs, Eel-worms, Plant Bugs, Hessian Fly, Wire-worm; (3) Insects Affecting Particular Crops: Mangold Fly, Hop Aphis, Bean Beetle, Corn Thrips, Gout Fly, Corn Saw-fly; (4) Insects Affecting Fruit Crops: Winter Moth, American Blight (Aphis), Gooseberry and Currant Saw-fly, Apple Blossom Weevil, Codlin Moth, Magpie Moth; (5) Insects Affecting Trees: Pine Beetle, Pine Weevil, Pine Saw fly, Goat Moth, Spruce Gall Aphis, Leopard Moth. The diagrams are sold singly at one shilling and sixpence each, or in sets. On each is shewn the natural size of the insect as well as the greatly enlarged picture, a very necessary matter, as otherwise most erroneous impressions are formed by the ignorant of the real dimensions of the creature referred to. There is also printed on each a general description, by Miss Eleanor A. Ormerod, of the life-history of the insect depicted, and of the best remedies to be employed against it.

A MANUAL OF NORTH AMERICAN BUTTERFLIES, by Charles J. Maynard: 8vo., pp. 226. Boston: DeWolfe, Fiske & Co., 1891.

We are always glad to welcome the publication of a new book which is likely to render more easy, and consequently to popularize, the study of entomology. The author of the work before us has, no doubt, had this object in view when preparing this manual, in which are brought together "for the first time, descriptions of all the species of butterflies which occur in North America, north of Mexico." He has evidently taken a great deal of pains in the execution of his task, and expended much labour upon the descriptions of over six hundred and thirty species of butterflies, and in the preparation of the illustrations, for "not only is a coloured plate given of one species of nearly all the genera, but wood cuts are given of some portion of about 250 species, illustrating some peculiar character by which the insect may be known; both plates and wood cuts have, with a single exception, been drawn and engraved by the author himself." The wood cuts, giving a wing, or a portion of a wing, of a number of closely allied species, will be found very useful helps by any one employing the book for the identification of his specimens, and are much superior to the coloured plates. Anyone with a large stock of specimens on hand, and with a few named in different genera to start with, will find this book a very useful and handy manual for the naming of his material, but this, we fear, is the extent of its value. The author has adopted the comparative method in his descriptions, which involves a constant reference to some other species, which the beginner in the study may chance not to have, and be woefully puzzled in consequence. There are no synopses, or comparative tables, of either genera or species given, but the author selects a species as his "type" and compares the other members of the genus with it. If the student possesses a specimen of this typical species his way will be fairly easy, but without it the investigation will be sadly difficult, if not hopeless. Another very serious defect in the book is the entire absence of all reference to the preparatory stages of the insects, and consequently to their food-plants, habits, dates of appearance, etc. We trust that the author may be enabled to issue a second edition of the work, and make it a thorough and complete "manual" by remedying the defects that we have referred to. That this may be done in a concise form and in a most useful manner is admirably proved by Stainton's "Manual of the British Moths and Butterflies," which we would commend to our author as a model for imitation when he enters upon the preparation of his next edition.

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ENTOMOLOGY FOR BEGINNERS—No. 2.

THE NORTHERN MOLE-CRICKET (*Gryllotalpa borealis*, BURM.)

BY JAMES FLETCHER, OTTAWA, ONT.

Anyone finding the strange-looking insect shown at fig. 1 will at once recognize it as the Northern Mole-cricket. It is apparently an uncommon insect in Canada, and it is partly to ascertain from the readers of the CANADIAN ENTOMOLOGIST whether or not this is the case that I am writing these notes upon a specimen which I have had in confinement for some months. I have been trying for years to get living specimens, but only succeeded last autumn when I had a fine female sent to me by Mr. W. W. Hilborn, who had caught it in his garden at Leamington, in Essex County, Ont. A short time afterwards I received from the same locality, from Mr. G. H. Mills, a male, but this was unfortunately injured in transit and died the day after arrival. There is to my mind nothing more interesting than keeping insects alive and watching their habits. This, too, after a little experience, becomes an easy matter if their habits are considered. I cannot, however, say that my Mole-cricket has been a very entertaining pet owing to its subterranean and nocturnal habits. I prepared a home for it in a large glass jar, 8 inches in diameter, and filled to the depth of about a foot with light, rich, sandy loam. Upon this was placed a potato and a small sod of lawn grass. The potato and grass soon threw out vigorous roots which now reach to the bottom of the jar. In the soil were also placed some earth-worms, as the food of Mole-crickets (like that of the other members of the *Gryllidæ*, or crickets to which it belongs) is of a mixed nature, and they are said to be particularly partial to earth-worms.

The name Mole-cricket is very appropriate for this insect, it is plainly a cricket, and at the same time its habits and even general appearance, but particularly the form and uses of its strong fore-legs, closely resemble those of the little mammal from which it takes its name. Our excellent

FIG. 1.

figure, which has been kindly lent by Prof. J. A. Lintner, shows the female natural size. The sexes differ very little. The male is slightly smaller. Westwood says :—" Indeed, as the females are destitute of an exserted ovipositor, it is only by a minute inspection of the veins of the wing covers that the sexes may be distinguished. The females in this family are not able to make a noise, the veins of their wing covers being more regularly disposed. The males are, morever, distinguished by having eight ventral segments in the abdomen, whilst there are only seven in the females." (Mod. Class. I, 443). There is only one species of Mole-cricket recorded from Canada. It is of the form shown above, of velvety seal-brown colour, which is darkest on the thorax. The wing covers are greyish, with dark veins, and the true wings are white and folded together like a fan. They are much larger than would be imagined from their small tail-like tips, which show beyond the wing covers on the back. The most remarkable feature of these insects is the strong fore-legs, with their expanded paw-like shanks, which bear four claw-like curved and hollowed projections at the lower edge; two of these are jointed at the base, and are in fact claws. The feet consist of three joints, which are attached about the middle of what, by the shanks being twisted obliquely outwards, is now the outside instead of the lower side. They consist of three joints: the first and second are large and claw-like, the second the smaller but reaching almost as far as the tip of the first; the third is very small indeed, and bears two weak true claws. The first two tarsal joints being of the shape described give great strength to the insect's " paw " when used for digging, for they lie right in front of the two articulated projections of the shank which fit closely to them, and the weak terminal joint lies between. The adaptability of these limbs for their required use is at once seen by the rapidity with which these insects dig down out of sight again when disturbed.

As stated above, Mole-crickets are nocturnal in their habits. They live in moist ground and near streams, where they sink their burrows some inches beneath the surface; but also throw up little ridges as they burrow nearer the surface, like miniature mole-runs.

They have not the power of jumping highly developed like other crickets, but can swim with ease if they fall into water. Their little shining black eyes, velvety coats and flexible bodies recall strongly the appearance of the otter, particularly when emerging from the water or crawling over stones. On the whole these interesting creatures are the most mammal-like insects I have ever seen. They keep in their burrows the greater part of the time, and I have only been able to catch sight of my specimen by going in quickly at night with a light. They move backwards with almost as great ease as forwards, the two caudal bristles being evidently very sensitive, for which reason they were designated caudal antennæ by one writer. The song of the male is described as "a low, continued, rather pleasant trill, quite similar to that of the common toad, but more shrill."

In Europe the Mole-cricket is described as being very injurious in certain localities from eating the young roots of plants and burrowing amongst the roots. There seems to be as much controversy, however, with regard to it as there is amongst farmers as to whether the mole is an injurious animal or not. Dr. Ritzema Bos says those who think that the Mole cricket is only injurious by burrowing beneath plants make a great mistake. The methods suggested for destroying it, should it at any time occur in large numbers, are the destruction of the eggs, which are laid to the number of from 200 to 400, in chambers about six inches beneath the surface of the ground, or killing the adults by means of poisoned baits, as grated carrot or potato mixed with arsenical substances.

Dr. Lintner says, Rep. VI., p. 151: "A method recommended by Kollar and approved by Curtis, as probably the best where the insect abounds, is to dig pits in the ground in the autumn, of a foot in diameter and two or three feet deep, to be filled with horse-dung and covered with earth. At the first frost all the crickets will be attracted to and congregate in these pits for warmth, where they can be conveniently killed." I shall be glad to hear from any reader of the ENTOMOLOGIST who may find this insect in his neighborhood, and also for any definite information concerning the food and habits. My jar is well filled with roots, and I frequently put a piece of raw meat on the surface of the ground, but I cannot say that I have ever seen that either it or the roots were much eaten. The ground is burrowed in every direction by clean burrows about as large as an ordinary lead pencil, and the Mole-cricket may sometimes be seen at night moving about in these burrows apparently in good health and quite at home.

TWO NEW ORTHOPTERA FROM INDIANA.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

LOCUSTIDAE—XIPHIDIUM. Serville.

Xiphidium Scudderi, nov. sp.

Female.—Front and sides of head and body dark reddish-brown; vertex, disk of pronotum and tegmina greenish-brown in life, (dull yellow after immersion in alcohol). A dark reddish-brown stripe extends from the front extremity of the fastigium to the posterior border of pronotum, and contrasts strongly with the general colour of vertex and disk of pronotum. Femora greenish-brown punctate with many dark brown impressions on their upper surface; the tibiæ darker. Antennæ with the basal third reddish, the remainder fuscous.

The apex between the eyes rather broad, with the sides rounded; the cone projecting strongly upward and forward and much more prominent, though narrower, than in *X. strictum*, Scudder.

The tegmina cover two-thirds of abdomen; the wings are shorter, reaching to middle of abdomen. Ovipositor of excessive length, almost twice as long as body; slender, and nearly straight until near the apex, where it is curved slightly upward. The posterior femora and tibiæ are also longer and more slender than is usual with members of the genus.

Measurements: ♀, length of body, 18 mm.; of antennæ, 52 mm.; of tegmina, 9.5 mm.; of wings, 7 mm.; of posterior femora, 16 mm.; of posterior tibiæ, 16 mm.; of ovipositor, 30 mm.

A dozen or more females of this striking species were taken from the margins of a large pond in Vigo County, Ind., on October 11th, 1891. Although in company with *Xiphidium strictum*, Scudder, and *X. brevipenne*, Scudder, yet it was at once noticeable on account of its dark glossy-brown colour and exceedingly long ovipositor. Careful search was made for the males, both then and two weeks later, when the pond was again visited, but none were found, and on the latter visit but one female was seen. Those taken were on the stems of the partially fallen rushes and sedges which filled the margins of the pond. When disturbed they gave two or three enormous leaps, and then moving rapidly for some little distance would endeavor to hide beneath the mass of fallen vegetation.

Since the above was in MSS., Mr. S. H. Scudder, in whose honour the species is named, and to whom specimens were sent, suggests that

McNeill's *Xiphidium sp. ?*, mentioned in PSYCHE, VI, 24, as being deformed and having the ovipositor two and a-half times as long as the body, may have been this species.

GRYLLIDAE—APITHES = (HAPITHUS), Uhler.

Apithes McNeilli, nov. sp.

Female.—Front margin of pronotum of same width (3.5 mm.) as head, slightly incurved; posterior margin but little broader, truncate. Tegmina slightly exceeding the abdomen, entire at the tip, the dorsal field the longer. Wings extending 2.5 mm. beyond the tip of tegmina. Posterior femora stoutish, exceeding the abdomen. Posterior tibiæ of same length as the femora, armed with two slightly divergent rows of spines on lower face—eight on the inner margin and five on the outer, besides the three at the apex on either side, the middle one of which is twice as long as any of the others. Between each two of the larger spines in the outer row are two small ones, about one-fourth the length of the large ones. The basal joint of tarsus has also a row of five spines on either margin of its lower face, the apical pair of which are much the longer.

The top of head, disk of pronotum, and the tegmina, are covered with a fine soft pubescence, visible only with the hand lens. All the tibiæ and upper and lower borders of posterior femora more coarsely pubescent with yellow hairs.

General colour, after immersion in alcohol, a dull brownish-yellow. A dark brown stripe reaches from eye to posterior border of pronotum. The tegmina with a small brown spot at their base, and the vein separating the dorsal from the lateral field with a number of oblong dark spots; the cross-veinlets are also much darker than the ones running lengthwise, giving the dorsal field a checkered appearance. All the femora are rather thickly marked with small dark spots, those on the posterior pair being arranged in regular rows. Extreme tip of ovipositor black.

Length of body, 16 mm.; of antennæ, 42 mm.; of tegmina, 14.5 mm.; of posterior femora, 9 mm.; of ovipositor, 12 mm.

A single female, the type specimen, was taken October 21st, 1891, from the lower leaves of a golden rod, *Solidago latifolia*, L., which grew in a thick upland woods in Vigo County, Ind.

I have named the species in honour of Prof. Jerome McNeill, of Fayetteville, Arkansas, a well-known writer on Orthoptera, and my first instructor in entomology.

SOME INDIANA ACRIDIDÆ.—II.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

Since my first paper on "Indiana Acrididæ," which was published in the ENTOMOLOGIST for April and May, 1891, was prepared, six additional species have been taken in Vigo County. Of these, one is new to science; a second has been known in the United States only from Florida and North Carolina; of a third, but one specimen, a female, has hitherto been recorded, and from it Dr. Thomas described the species; while a fourth has not before been taken west of New Jersey. With the habits and local distribution, as far as noted, of these six species, together with the description of three of them, the present paper deals.

The following works may be added to the list given in the preceding paper to which the synonymy refers:—

Comstock, J. H.—An Introduction to Entomology, I., 1888.

Fernald, C. H.—The Orthoptera of New England, 1888.

McNeill, Jerome—"A List of the Orthoptera of Illinois" in Psyche, April and May, 1891.

Scudder, S. H.—Boston Journal of Natural History, VII., No. III., 1862.

Thomas, Cyrus H.—In "U. S. Geological Survey of Montana and Adjacent Territory," 1871.

ACRIDIDÆ.

ACRIDINÆ.

TRUXALINI.

1. LEPTYSMA MARGINICOLLIS, Serville.

Opomala marginicollis, Thomas, Syn. Acrid. N. A., 1873, 66, 196, 250 (note).

Leptysma marginicollis, Scudder, Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 87.

Leptysma marginicolle, Comstock, Introduction to Entomology, I., 1888, 111, fig. 102.

On October 11th, and again on the 24th, a number of specimens of this slender bodied, graceful species were taken from the tall sedges and rushes which grew near the margin of a large pond in the river bottom of the southern part of Vigo Co. Its range has heretofore been supposed to be a strictly southern one, and Thomas, in the note, loc. cit., states

that it is doubtful if it really belongs to the U. S. fauna. Mr. S. H. Scudder has, however, since recorded it from Florida, and in a personal letter says that it has also been taken in North Carolina, but not farther north.

Its occurrence in numbers as far north as Central Indiana is therefore worthy of record, and can only be accounted for by the presence of the broad and sheltering valley of the Wabash, within the confines of which it finds a climate and vegetation congenial to its taste.

If its habits be the same elsewhere as in Indiana, the name "grasshopper" is for it a misnomer, for here it is never seen on the grass or ground, and never hops when disturbed, but moves with a quick and noiseless flight for twenty or more feet, to a stem of sedge or rush, on which it alights. The instant it grasps the stem it dodges quickly around to the side opposite the intruder. Then, holding the stem firmly with its short front and middle legs, it draws its slender hind femora close up against the body, and folding the tibiae into position, hugs its support as closely as possible, and remains perfectly motionless. Its body is almost cylindrical, and being of the same general colour as the stalk of the plant on which it rests, it is almost impossible to detect it, unless one sees exactly where it alights. Eight times out of ten a person by approaching quietly can reach his hand about the plant stem and grasp the insect. Its habits excellently illustrate the so-called "protective mimicry" of form and colouring, as it always seems to choose a cylindrical object, and one similar to its own colour before alighting.

As the description given by Thomas, loc. cit., is the only one in American works of reference, and, moreover, is a very short and poor one, I append the following drawn from fresh specimens, and hope that collectors throughout the Northern States will be on the lookout for this interesting and peculiar species :—

Body very slender, sub-cylindrical. Antennæ short, somewhat ensiform. Vertex extending far forward in the form of an equilateral triangle, slightly sulcate on its anterior half. Face very oblique, median carina weak, narrowly sulcate for its entire length; lateral carinæ slight and straight. Pronotum almost cylindrical, slightly divergent on posterior half; median carina present, distinct only on posterior lobe; lateral carinæ obsolete. Prosternal spine short and rounded. Face, vertex, occiput, and disk and sides of pronotum densely punctured. Tegmina exceeding the abdomen by 3 to 5 mm. Wings equal to tegmina in male, slightly shorter in female. Posterior femora very slender, not reaching tip of abdomen. Anal cerci of male slender, tapering, and bent abruptly upward and forward near the base. Sub anal plate narrow, upturned and tapering to a point.

The ground colour is a fawn, unbroken except by a narrow, yellowish stripe, extending from the hind border of eye, along the lower edge of pronotum to coxa of hind

leg In living specimens this line is bordered above by one of dark brown. When the insect is dried the brown fades and the tips of tegmina become darker. Length of body to tip of tegmina, male, 30 mm.; female, 37 mm., of antennæ, male, 8 mm.; female, 6 mm.; of tegmina, male, 20 mm., female, 26 mm.; of posterior femora, male, 14 mm., female, 17.5 mm.

OEDIPODINI.

2. SPHARAGEMON BOLLI, Scudder.

Spharagemon bolli, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 469.
McNeill, "Orthop. of Ill.," Psyche, VI., 1891, 64.

Dissosteira bolli, Fern., Orth. of N. Eng., 1888, 43.

This species is much less common than *S. balteatum*, Scudd., but three specimens having been secured. It may be readily known from *balteatum* by the higher crest of the pronotum, by the general colour being darker, the bands across the tegmina more distinct, and by having the tip of wing as black as the median arcuate band. It frequents high, dry woods, and moves with a quick, almost noiseless flight, but is clumsy as a hopper.

Sept. 1st, Oct. 17th, in copulation.

ACRIDINI.

3. MELANOPLUS GRISEUS, Thomas.

Caloptenus griseus, Thos., Geol. Surv. Terr., 1871, 454.
Id., Syn. Acrid. N. A., 1873, 165.

A single ♂ of this handsome *Melanoplus* was taken in Putnam County, on August 25th. It hopped across a roadway in the woods in company with numerous specimens of *M. femur-rubrum*, and was at once detected on account of its peculiar coloration.

On October 17th, a ♂ and ♀ were taken from near the base of trees in a high woodland pasture in Vigo County, and again on November 15th a single female was found in a similar locality.

These four are all that I have ever seen. No one of them took to flight, and their movements on the ground were exceedingly clumsy, they being easily captured with the hand. As Thomas, loc. cit., described the species from a single ♀ taken in Ohio, and as I can find no reference to the species other than those cited above, I add the following description of the ♂, drawn from a fresh specimen, together with accurate measurements of both sexes.

The length of *M. femur-rubrum* but thicker bodied. Head rather large with the occiput elevated; eyes prominent. Vertex very narrow between the eyes; the fastigium deeply sulcate; foveola present but minute, their outline circular. Frontal ridge rather broad, sulcate at the ocellus, convex between the antennæ, punctate with black depressions along each margin for its full length. Lateral carinæ prominent, but little divergent. Pronotum nearly uniform in width, expanding slightly posteriorly; the median carina distinct only on the posterior lobe, and deeply cut by the three transverse sulci; posterior lobe punctate with dark impressions. Tegmina extending 5 mm. beyond the tip of abdomen; wings but little shorter. The terminal ventral segment turned up, narrow, acuminate, entire. The anal cerci are strongly bent upward near their middle, and bear on their lower edge a broad, triangular, wing-like expansion, the apex of which is opposite the bend.

Colour.—Face, occiput, and disk of pronotum a grayish-lilac with numerous fleckings of sooty black. A broad stripe of black starts from the eye and extends back along the upper side of pronotum to the posterior transverse sulcus. Tegmina grayish-olive, marked regularly over almost their entire surface with subquadrate fuscous spots which are much larger than those possessed by *femur-rubrum*. Wings transparent, tinged with pale yellow on basal third, the veins of apical fourth fuliginous. Three bands of black cross each femur and are alternated with bands of grayish-blue of the same width. Posterior tibiæ with the basal third red, the remainder gray with black spines; knees black; venter pale yellow, (alcohol changes the black to a reddish-brown, and the grayish hues to a dull yellow). Dimensions:—Length of body, ♂ 24 mm., ♀ 27 mm.; of tegmina, ♂ 20 mm., ♀ 22 mm.; of antennæ, ♂ 11 mm., ♀ 12 mm.; of posterior femora, ♂ 14 mm., ♀ 15 mm.

The peculiar mottled appearance, and the broad expansion of the anal cerci of the ♂, serve to distinguish this species from all other *Melanopli* of the E. U. S.

4. PEZOTETTIX HOOSIERI, nov. sp.

Antennæ of ♂ very long, exceeding the length of posterior femora. Vertex between the eyes narrow, scarcely as broad as the basal joint of antennæ, (broader in the ♀), expanding and prominent in front of the eyes where it is broadly but shallowly sulcate; foveola about twice as long as wide, slightly narrowed in front, more prominent in the ♀. Frontal ridge rather broad, regular, scarcely if at all sulcate below the ocellus;

lateral carinæ well developed, but little divergent. Pronotum broadening slightly on posterior half, (more noticeable in the ♀); median carina distinct and equal throughout, the transverse sulci scarcely noticeable in the ♀, distinct but shallow in the ♂; the lateral carinæ present but rounded obtusely off; the disk and sides of posterior lobe densely and rather coarsely punctate. Tegmina oblong, two and a-half times as long as broad, reaching to middle of abdomen and slightly over-lapping on the median dorsal line, the wings but little shorter. Last ventral segment of the abdomen of ♂ broader than high, tumid posteriorly, the lateral edges higher and flaring slightly outwards. Cerci long and slender, gently incurved, narrowed at the middle, with the apical third flattened and slightly hollowed on the exterior face.

Colour of living specimens:—Male—Antennæ rufous, infuscated at tip, and with the apical sixth of each segment yellowish. Face green, clypeus and mouth parts yellow. Vertex, disk of pronotum and tegmina plain olive, immaculate. Lateral lobes of pronotum greenish-yellow below; above with a broad, shining, black line reaching from the eye to their posterior edge. The venter pale yellow, and the meta-pleural episterna with an oblique yellow line. Femora green; knees black; posterior tibiæ greenish, rufous at base, with black spines.

Female—Duller; the disk of pronotum and tegmina sometimes with minute fuscous spots; a black stripe on the sides of abdomen, above which are numerous small black blotches.

Measurements:—Length of body, ♂ 22 mm., ♀ 31 mm.; of antennæ, ♂ 15 mm., ♀ 11 mm.; of tegmina, ♂ 10 mm., ♀ 13 mm.; of hind femora, ♂ 14 mm., ♀ 17.5 mm. 13 ♂'s, 11 ♀'s.

About the margin of the pond above mentioned, this Pezotettix was found in numbers on October 17th. It was at once noticeable on account of the length of the male antennæ, and the black stripes on the sides of the abdomen of the female. The pond was almost dry, and the dense growth of sedges and rushes which had filled its shallow margins, were, in some places, burned away. Over the burned spots had sprung up a dense green vegetation, and here this Pezotettix flourished in company with *Truxalis brevicornis* and *Chrysochraon viridis*, while a few feet away *Leptysma marginicollis* found a suitable home amongst the rushes and sedges still standing.

Both sexes of *P. hoosieri* were very active, leaping vigorously when approached, and difficult to capture except by throwing the net over

them as they rested on the ground. The females were exceedingly difficult to kill in the cyanide bottle, "coming to" after having been kept in it for several hours, although the males and the other insects above mentioned were killed in a few minutes. On Oct. 27th the spot was again visited, and, although several heavy frosts had occurred, yet the species was still fairly common. At this time, however, they were all found in the small patches of grass which grew among the fallen leaves a few yards from the edges of the pond proper.

TETTIGINÆ.

5. BATRACHIDEA CARINATA, Scudder.

Batrachidea carinata, Scudd, Bost. Jour. Nat. Hist., VII., 1862, 479.
Thos. Syn. Acrid. N. A., 1873, 190.
Fernald, Orth. N. E., 1888, 49.
Tettix cristatus, McNeill, Psyche, May, 1891, 77.

Two males of this species were taken, in company with numerous young and adults of *B. cristata*, Harris, from a grassy hillside on April 1st, 1891. Although Bolivar, according to McNeill, has made *carinata* a synonym of *cristata*, yet, in my opinion, the two are as distinct as are the two common species of *Tettigidea*. *Carinata* has the pronotum extending 3 mm., and the wings 4 mm. beyond the tip of abdomen, whereas *cristata* has the pronotum of the same length as the abdomen and the wings lacking 2 mm. of reaching its tip. Moreover, the median crest of the pronotum is not so prominent nor so strongly arched in *carinata* as in *cristata*. Length of pronotum of *cristata*, ♂ 7 mm.; of *carinata*, ♂ 9.5 mm. *Carinata* has not before been reported west of New Jersey.

6. TETTIX CUCULLATUS, Burm.

Tettix cucullata, Scudd., Bost. Jour. Nat. Hist., VII., 1862, 475.
Thos., Syn. Acrid. N. A., 1873, 185.
Tettix cucullatus, Fernald, Orth. N. E., 1888, 47.
McNeill, Psyche, VI., 1891, 77.

Several half-grown young and two adults of this species were taken on April 1st, and on Sept. 15th a large number of adults were secured. It appears to be widely distributed over the Eastern U. S., its occurrence having been observed from New England to Sherman, Texas, at which latter locality I took a number of specimens on July 11th. It is evidently a water-loving species, as those taken in Texas, and most of those secured

in Indiana, were found along the damp, sandy or muddy margins of small streams, in company with *Galgulus oculatus*, a common Hemipteron, which abounds in the situations. *Cicindelas*, when disturbed, has a more prolonged flight than any other of our *Tetigonæ*.

The life-history of the "grouse locusts" is, as yet, very imperfectly known. In the proper localities mature specimens of most of the six species so far noted in Indiana can be taken almost any day in the year. *Tettix ornata*, Say, and *Tettigidea polymorpha*, Burm., were found in copulation on April 18th, and the latter species again on May 31st; while, as noted above, the half-grown young of two species were collected on April 1st.

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No. 18, Paratettix viridipes? Walsh, Mss., of my first paper, is *Paratettix viridulus*, Walsh, as I have since determined by comparison with specimens of the latter taken by Prof. McNeill at Moline, Ill. It was the third full-grown species, other than *Tettigonæ* taken last season, having been preceded by *Chortophaga viridifasciata*, De Geer, Apr. 26th, and *Argiscs sulphurcus*, Fab., May 20th. Two mature males of *P. viridulus* were taken on May 30th, and others were found at intervals throughout June, but it is by no means a common species in this locality.

FURTHER NOTES ON GELECHIA GALLÆDIPLOPAPPI AND DESCRIPTION OF A NEW SPECIES OF BRACON.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In a paper entitled "A Day in the Woods," I brought under the notice of the Entomological Society of Ontario, at its annual meeting held in London on the 27th of August, 1890, the galls formed by *G. gallædiplopappi* and gave an account of the chrysalis and perfect insect. I also alluded to two kinds of parasites preying upon the species. The description of the moth was reproduced in the December number of the CANADIAN ENTOMOLOGIST of that year (Vol. XXII., p. 248).

The insect has again come under my observation, and I am able to furnish these further particulars concerning it :—

The larva of the species when full grown is four lines in length. Its colour is light seal brown, and it has a dorsal line of darker brown, and a few dark patches on the three last segments. Its head is black. There are a few bristles on the head and along the sides. It assumes the chrysalis form in the beginning of July.

The moths continue to appear from the 1st of August to the close of the month.

At least three kinds of parasites molest the species :—

1. *Pimpla pterelis*, Say, which, in August, issues in its perfect state from the chrysalis of the moth. (See 22nd Ann. Rep., Ent. Soc. of Ont., p. 18). This species was identified for me by Mr. Harrington.

2. An insect which, in its larval condition, leaves the chrysalis of the moth about the 10th of July, The larva is nearly four lines in length, and is white with a tinge of pink. It spins a white cocoon within the gall. I have two or three of the cocoons, and hope to obtain the perfect insects in due course.

3. A Bracon.—The larvæ of this, numbering from four to ten in a batch, consume the remains of their host at the end of July, and then spin their light drab cocoons in a cluster at the bottom of the gall. The flies appear about the 10th of April.

The perfect insect has the head and thorax black. The abdomen, which is somewhat spindle-shaped, and is attenuated at the junction with the thorax, is honey-yellow, with a brown patch on the upper part of each segment—in some instances the upper part of each segment is entirely suffused with brown. The mouth organs are honey-yellow, and the legs, with the exception of the tarsi of the hindmost pair, which are light brown, are of the same colour. The ovipositor of the female is longer than the abdomen. Its sheath is blunt, hairy and black at the tip, and does not divide in drying.

I cannot learn that this insect has hitherto been described or named. I would therefore suggest for it the appellation *Bracon furtivus.*

NOTES ON THE LIFE-HISTORY OF AGALLIA SANGUINOLENTA, Prov.*

BY HERBERT OSBORN AND H. A. GOSSARD, AMES, IOWA.

This leaf-hopper is considered a clover pest, but is also known to feed on beets, rutabagas, cabbages and blue grass. It is active even in midwinter on sunshiny days. The eggs are thrust beneath the epidermis of the food-plant, and the first brood of larvæ appears from the middle of May until July 1st. The earliest individuals of the brood are nearly mature by the first of July and are supposed to begin egg-laying a little later. Larvæ can be found in all stages of growth from this time until the advent of winter, but most of the individuals are believed to be included in two broods.

ON THE ORTHOPTEROUS FAUNA OF IOWA.*

BY HERBERT OSBORN, AMES, IOWA.

The Preliminary List of the Orthoptera of Iowa, published by Prof. C. E. Bessey in the Seventh Biennial Report of the Iowa Agricultural College, is revised, a number of species being added and a number of names taken from incorrectly determined specimens rectified.

The revised list is represented thus in the following families :—

Family *Forficulidæ.*

One species.

Family *Blattidæ.*

Four species.

Family *Phasmidæ.*

One species.

Family *Acrididæ.*

Forty-one species.

Family *Locustidæ.*

Twenty-three species, probably twenty-four.

Family *Gryllidæ.*

Ten species.

Total, eighty or eighty-one species.

HOW THE FEMALE OF CACOECIA SEMIFERANA PROTECTS HER EGG-CLUSTERS.*

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

The Box Elder Leafroller, *Cacoecia semiferana*, was very abundant in many places in Colorado last summer, and in July the moths were swarming in the trees in the evening, presumably to deposit their eggs. The eggs were found beneath a gluey mass, somewhat similar to that used by the tent caterpillar in protecting her eggs, but it was largely covered with what appeared to be scales from the moth, placed like the shingles on a roof. A careful examination of these shingled patches under the microscope makes it seem certain that the eggs are first all deposited, the glue is then added, and after this the abdomen is laid at full length in the sticky substance until it hardens, when the abdomen is removed, and the scales covering its under side are drawn and left covering the eggs.

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*Abstracts of entomological papers read before the Iowa Academy of the Sciences, Des Moines, Iowa, December 28 and 29, 1891.

NOTES ON COLEOPTERA.—No. 9.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Philydrus, CAN. ENT., XVI., 186.—The paragraph commencing with "*Philhydrus*" should be corrected as follows:—*Philydrus perplexus*, Lec., and *P. Hamiltoni*, Horn, are found [on Brigantine Beach] in the fresh water pools which form at the base of the sand-hills, with *Hydrophilus glaber* and *Copelatus glyphicus;* while *Philydrus reflexipennis* occurs in the salt marshes under pieces of wood and recent tide-drift, seeming to inhabit salt or very brackish water, as it has not been taken in fresh water with the species mentioned. When the paragraph was penned *P. Hamiltoni*, since described, was supposed to be *reflexipennis*, and the true *reflexipennis* a variety of *ochraceus*.

Philydrus fimbriatus, CAN. ENT., XX., 63.—The variety noticed as inhabiting hill and mountain rivulets has recently been described as a species, and is *Cymbiodyta Blanchardi*, Horn.

Cercyon littoralis, Gyll.—This nice species occurred very abundantly in September at Longport, near Atlantic City, New Jersey. It inhabits under the softer grass washed from the Bay deposited on sand flats, and which has remained there long enough for breeding purposes. Though represented as very variable in colour and markings, the only differences observed in several hundred individuals examined was that about one-half were entirely piceous black, while the remainder had the posterior fourth of the elytra pallid. *Cercyon* has heretofore been much neglected by most American collectors, but the genus having been recently monographed by an able hand, and the species defined by characters usually of easy observation, they are likely to become better known. All things considered, this species seems to be native in North America as well as in Europe. Here it has been taken on Magdalen Island, Gulf of St. Lawrence; Coney Island, New York; the New Jersey sea coast, and in Illinois (Horn, monograph). In Europe, skirting the Western Mediterranean shores, it follow the Atlantic Coast to N. Lat. 66° 50′, and also occurs in Northern Asia on the shores of the Obi. The *Cercyons*, so far from being despicable, are very interesting beetles, and no genus of equal extent contains so many forms common to the Old and New Worlds. In fact, of the 25 American species monographed by Dr. Horn, 14 likewise occur in Europe.

Trogophloeus convexulus, Lec. — Several examples (it occurred abundantly) of this minute beetle were taken on the salt marshes near

Longport, New Jersey, in September. The identification is due to Mr. H. Ulke, confirmatory of a like diagnosis by myself. The most, or indeed all of the species of *Trogophloeus* which I have heretofore taken, occur wandering about in very wet places, taking refuge under leaves, sticks, &c.; but the present species differs in being found in places comparatively dry, and in constructing surface galleries like many of the species of Bledius, some of which it closely resembles. Dr. Leconte described the species from an individual from New York, and another from Kansas, which, till the present time, do not appear to have been duplicated. These two examples, measuring each .07 inch in length, represent the smallest individuals; the length of a number taken together averaging over .09 inch. There are no thoracic impressions whatever visible in the great majority of individuals, but occasionally one of the larger ones bears indistinct traces of the usual basal marks, barely discernible in certain lights. The smooth thoracic line is usually conspicuous, which, with the piceous or black antennæ and parti-coloured feet, make this species of easy recognition. This species likewise occurred on Brigantine Beach, and may be looked for in the salt marshes anywhere along the Atlantic Coast.

Callichroma splendidum, Lec.—This well-known and highly-prized beetle is distributed along the Atlantic coast from Delaware to Key West, Florida, around the Gulf of Mexico to Southwestern Texas, and northward along the Mississippi to Arkansas. It is known to breed in the trunk and immense roots of a tree growing in the Southern swamps, especially in such as sustain Cypress, and is known in different places by such names as Sour Tupelo, Large Tupelo, Wild Olive, Wild Lime, Gum-Elastic Tree, &c., being the *Nyssa uniflora*, Walt., congeneric with *N. multiflora*, Weng., the abundant and well-known Gum Tree, or Pepperidge, common in many of the Northern States. The leaves and fruit of this tree, with several of its brilliant inhabitants, were recently received from Alabama, by which I am able to confirm the one or two observed records of its larval habits. It may, however, breed in other species of trees, as the first example in my collection was presented by a young naval surgeon, who took it on Key West, Florida, a place where *Nyssa* probably does not grow. The individuals of this species vary considerably in size, the sculpture of the thorax, and the colour of the elytra. An individual from Delaware measures .85 inch in length; the one from Key West and another from Texas 1.70 inch each, but the average

appears to be near 1.30 inch. The colour of the thorax is uniformly a brilliant fiery copper, with green reflections when seen after night or in certain lights, and is a specific character; the thorax differs in individuals from being deeply rugous to comparatively smooth, and in the prominence of the lateral spines and tuberosities. The elytra in the large majority are deep sericeous green, but in some examples, more or less shot with copper, which in some individuals becomes the prevailing colour, known in some collections as *virescens.*

Some time ago I had an opportunity to examine several examples of each of two species of *Callichroma* taken in Cuba, one of which, labelled *columbina*, Dej., seems only to differ from *splendidum* by having the thorax colored coppery bluish or violet; if other differences exist they escaped observation.

This species was described very briefly by Dr. Leconte under Dejean's catalogue name *splendidum*, with *Cerambyx elegans*, Fab., Oliv., Hald., in synomymy (Jour. Acad. Nat. Sci., Phil., 2d Ser., II., 37). Dr. Asa Fitch, however, states (Rep. 4, 711,) that Linnæus had previously described it under the name *suaveolens*, from an example sent him from Carolina by Dr. Garden. (Appendix to last Ed. Syst. Nat., III., 224, 1770.) At one time this species was considered an inhabitant of the West India Islands, being probably mistaken for *columbina* or some allied species. In fact, some of the species of *Callichroma*, of which I have seen nine, are uncomfortably close, and separated by characters which, in many genera, are of little moment.

C plicatum, Lec., is strikingly like *splendidum*, but the green colour of the head and thorax is constant and devoid of any coppery reflections. The habits of the two species, if I am rightly informed, are more confirmatory of their being specifically different than anything yet observed in their external structural characters. A friend (not an entomologist), from Hamilton County, Central Texas, says this species breeds in old cactus. While requiring further confirmation, this statement is probably correct, from the fact that there has been no record observed of its having been taken in swamps with *splendidum*, and from the fact that it occurs only in cactus regions in Texas to Arizona, where it was taken near the south-eastern boundary at Camp Bowie. (Wheeler's Reports on Exp. and Surv., Vol. V., Zoology, p. 821.)

Eupogonius tomentosus, Hald.—Here this species is not common;

till recently all the examples in my collection were bred from dead hickory limbs (once). All other observed records of its habits represent it as inhabiting in its early stages pines. This is with scarcely a doubt the species Dr. Fitch describes under the name "*E. pinivora*, Pine-eating Gay-beard" (Rep. iv., 712), which he says differs from *E. tomentosus* by the erect hairs on the body and antennæ being black, a different form of spots on the elytra and the smaller size. The last two are of no value, as the length of *tomentosus* varies from .20 inch to .33 inch, and the elytra from having scarcely perceptible patches of pubescence to the high ornamentation of Dr. Fitch's *pinivora*, while the black colour of the erect hairs was very probably an optical deception, from a perhaps careless comparison of bright fresh examples with older faded ones ; any one who has the insect can readily see how this might occur, by examining a specimen after night, or by a dull light. This species is distributed from Florida to Canada, occurring in New York and Michigan. The locality from which the hickory limbs from which my examples were bred were obtained is remote from any place growing pine, and the occurrence can scarcely be regarded as fortuitous. *E. vestitus* is very commonly bred here from hickory.

Elleschus, CAN. ENT., XVI., 106.—The *Elleschus bipunctatus*, mentioned at the place cited, proves to be one of the forms of *E. scanicus*, Payk., as determined by Dr. W. G. Dietz on comparison with authenticated European examples. The colour and the elytral markings of this species seem to be locally variable, and in the present instance scarcely or not differing from those of *bipunctatus*. This form has been sent me from Europe as *bipunctatus*, but an examination of the structural characters shows it to be the same as my American form. The typical form of Paykull was rufo-testaceous with fasciate elytra, and a similar form was taken by Dr. Dietz at Hazleton, Pennsylvania, from which a redescription of the species was made and a figure drawn (Tr. Am. Ent. Soc., 18, 264, plate vii., fig. 35, 35*a*). As he had not then seen this form it is not mentioned in Dr. Dietz's excellent paper, and from his description and figure of the species it would not be readily recognized as the same. Some individuals have no markings whatever, not even a trace, and all others have, more or less visible, the small spot on the disk of the elytra before mentioned, any others being attributable to abrasion. The colour varies from piceous to pale. This species is only known from here, and at Hazleton certainly. Common throughout Europe on willow.

Dr. Dietz records *E. bipunctatus* as occurring in Canada ; Hubbard and Schwarz, in Northern Michigan.

Anthonomus musculus, Say, and *A. signatus*, Say.—In 1831 Say published in his Curculio, p. 15, a description of *A. musculus*, and on p. 25 that of *A. signatus*, and from the descriptions it is evident he had before him two distinct species. In Leconte and Horn's Rhyncophora, a species is assigned to each name separated by definite characters ; and in Dr. W. G. Dietz's elaborate revision of the tribe lately published, these are still more clearly defined. One of these species is of economic importance, being occasionally exceedingly destructive to the cultivated strawberry. Owing to the difficulties encountered in attempting to separate them, some economic entomologists now solve the matter by uniting the species, unfortunately, under the name of the one having typographical precedence—*musculus*. Prof. C. V. Riley devotes several pages in one of the Government agricultural reports (1885, p. 276–282,) to the discussion.

The true *musculus* is not very common here, and is usually found in colonies on huckleberry blossoms—I have never taken a specimen on anything else—and occurs here from the middle of May till the first of June. Whole acres may be hunted over without obtaining a single specimen. The individuals seem to vary only from degrees of maturity, Say's description having been drawn from examples recently disclosed, while his variety is the more mature. *A. signatus*, on the other hand, is protean in colour and elytral ornamentation, so much so that judged by this alone it might be divided into several species. It appears about the first of June, and may be found more or less abundantly all summer. It eats the leaves and blossoms of many species of trees and shrubs. I have taken it abundantly on Tilea and Rhus, and it seems to have a decided taste for certain Rosaceæ—notably, *Rubus*.

Diligent search has several times been made in the fields of the cultivated strawberry without finding any *Anthonomus*, and efforts to obtain the strawberry form from correspondents have equally failed. *A. signatus*, however, is often seen on the leaves of the wild strawberry, through which it eats holes like it does to the leaves of Rubus. Both species may possibly depredate in strawberry plantations, but it would be a wide departure for the true *musculus* from any of its known habits.

From the unanimity of systematists in maintaining the distinctness of the species, it will be necessary for economic entomologists, if they care

for accuracy, to make further investigation and ascertain which it is by which the mischief is done, or whether both species may not be concerned in different places. There will be little trouble in doing this, provided the huckleberry insect can be found with which to make the comparison, as they are only moderately difficult to separate when both forms are at hand.

NOTES ON THE ÆGERIADÆ OF CENTRAL OHIO.

BY D. S. KELLICOTT, COLUMBUS, OHIO.

The Lepidopterous family to which these notes pertain is a homogeneous and distinct one, clearly and sufficiently separated from other families. The larvæ, so far as known, are borers in roots, stems, branches, or excrescences of trees, shrubs or annuals, yet all strictly retain the structure and appearance of the young of their order. Most of them pass the winter buried in the food plant. A few, however, hibernate as pupæ or as larvæ, protected by cocoons. The most remarkable variation of the adolescent period is in the variable length of time from egg to pupa. Certain wood-boring species, *Harmonia pini* for example, pupate and disclose the imago the third year from the egg; others complete their changes in a few weeks. The pupæ are quite similar. The clypeus is usually armed with a protuberance, and the abdominal rings with transverse rows of spines, agreeing in this respect with normal pupæ of Tortricidæ, Cossidæ and Hepialidæ.

The moths are among the most beautiful of insects, and in other ways they are no less attractive. Their exquisite form, coloration and gracefulness of motion appeal to every one permitted to see them, but the highest enjoyment is reserved for those who appreciate the extent and exactness of *protective mimicry* exhibited by these insects. So intimately do they simulate the appearance, aided many times by sounds, odours and attitudes of wasps and bees, that the very elect in entomology are often deceived and cheated. Again, their habits render many of them grave pests, compelling attention from horticulturist and economic entomologist.

In spite of these reasons, and more that might be alleged for their collection and study, they are not well represented in collections. In fact, in a majority of collections which I have had the pleasure to examine Ægeriadæ, like Odonata, are few and ill-favoured. This is to be regretted; but since we have the material in abundance, the defects may

and will be remedied. The situation is relieved somewhat by the thought that there is certainly one unique collection of the Ægerians in this country, namely, that of the late Henry Edwards. What disposition is to be made of it I know not. Perhaps no one does. All sincerely hope that it may speedily find a safe resting-place, accessible to the interested student, and where it will be properly cared for, and will duly honour our foremost student of this group.

The list of species of this family thus far collected at Columbus, I am aware, is only a partial one—one which it is hoped may be greatly increased in the near future. Such facts as are at hand, it is hoped, will prove interesting and suggestive. I follow the generic arrangement of Henry Edwards in Grote's Check List of N. A. Lepidoptera.

Melittia ceto, West., *(cucurbitæ*, Harris).—The squash-borer occurs abundantly in Central Ohio, and, indeed, throughout the State. In localities where cucurbitaceous plants are cultivated on a commercial scale it is a veritable pest. Is it double brooded? Since Dr. Harris's account of its habits more than sixty years ago, it has been regarded as single brooded, the moth appearing in early summer, the mature larva entering the soil in July and August, enclosing itself in a gummy cocoon in which it remains until the following spring, when it completes its transformations. During the last days of August Prof. F. M. Webster and myself found in squash vines on the Ohio Agricultural Experiment Station Farm larvæ of different sizes; a few inches below the surface cocoons containing larvæ were found, and one fresh imago was taken resting on the leaves. By September 20 all the larvæ were out of the stems and could be found in their dark, oblong cocoons from two to four inches beneath the surface. My friend Webster asked me if the species was two-brooded. I replied by asking him the same question. At the time I did not recall the paper by Prof. S. H. Scudder in Psyche, vol. iv., p. 303, in which he recounts finding in squash vines on Cape Cod in September two larvæ, one much larger than the other and apparently specifically distinct. He describes each and raises the question, Is *M. ceto* double brooded or are there two species passing under that name? Only the larger forms found by the writer were preserved and carefully examined; they were typical *Melittia ceto*. The single imago was likewise a typical example of that species. It seems probable from the facts at hand that in Central Ohio and South the species is double brooded.

Alcathoe caudatum, Harris.—This unique species is the sole representative of its genus. It was described by Harris in vol. xxxvi. of Silliman's Journal. His description has been copied by many authors and nothing added. This is evidently due to the fact that the insect is rare. A number of working entomologists have assured me that they had never taken it. The latter part of August, 1889, three examples were seen by me visiting blossoms of *Mileolotus* on the Ohio State University grounds; two males were captured, the third, a female, escaped.

Harris describes the forewings of the male as "transparent from the base to the middle." In both of my specimens there are only clear streaks, one on either side of the median vein; indeed, when first taken these lines were scarcely perceptible. The coxæ and femora are black; tibiæ orange, with more or less perfect black rings at base and apex of second and third; tarsi tawny orange, with first joint of last pair surrounded by a heavy band of orange hairs and a few black ones outwardly at the base; the palpi are light, bright orange below, darker above, whilst the antennæ are of the same shade as the upper surface of the palpi, but having the double row of fringes blackish. The caudal appendage, which is fully as long as the abdomen, is bright orange; the caudal tufts are black and orange. Harris gave the black currant as the larval food-plant. Henry Edwards, in Transformations of N. A. Lepidoptera, mentions the stems, of *Clematis* also. I have not been able to find the larva in either of these plants.

Bembecia marginata, Harris.—This species occurs everywhere about Columbus in the native blackberry. Thus far I have not heard that it has given trouble to the cultivator. The moths may be taken in September resting on the foliage of plants near the food of the larva.

Podosesia syringæ, Harris.—As the specific name implies the larval food-plant is the lilac. If it would confine its attention to this old-fashioned ornament of lawn and garden it would have far less economic interest. But, unfortunately, it attacks and destroys the white and the European ash, as well as the mountain ash, *Pyrus Americana*. Large numbers of them were found in the trunks of the last in April, 1891; several trees on the Ohio State University campus were found greatly damaged by them. It may, therefore, yet be found to injure other and more valuable rosaceous trees in cultivation.

Sannina exitiosa, Say.—The Ægerian peach-tree borer is far too abundant wherever the peach is cultivated. Central Ohio is not an exception.

Ægeria gallivora, West.—In May last I obtained from a globular excrescence on an oak twig three Ægerians—one male and two females. They were at first taken to be *Ægeria hospes*, Walsh, until a careful comparison was made with the original description of that species in vol. vi., p. 270, of the Proceedings of the Entomological Society of Philadelphia, when I found good evidence that the moths were not of that species. The following characters seem to afford sufficient grounds for this conclusion:—1. They were larger, expanse .75 inch (*Hospes* .57 inch); 2. there is a well-marked black band at tip of hind tibiæ, in the female as wide as half the length of the joint, or the whole space distal of the middle spurs (*Hospes* has the tibiæ tipped with blackish only); 3. the second abdominal band of female is broad and the yellow ventral patch much longer and more clearly defined than in the male (according to Walsh, this band is not broad and the spot is only half as long as in the male); 4. the expanse of *Hospes* female is .50 inch, of these .75 inch; 5. and again, these have a yellow collar and the first joint of the antennæ maculate in both sexes, whilst the female *Hospes* has the first antennal joint immaculate (Walsh).

Are these moths Westwood's *Trochilium gallivora*? His description is inadequate, and without a comparison with the type there must always remain some uncertainty. Nevertheless, I refer my specimens to that species for the following reasons:—1. Westwood's specimens were bred from galls of *Quercus palustris* received from U. S. (Papilio II., p. 97). 2. The size is nearly the same (*Gallivora*, alar expanse 8 lines). 3. "*Legs yellow, with a dark ring around the tibiæ near the tips*," characterizes this feature exactly, especially true of the hind tibiæ; the first and second pairs are yellow, with more or less blackish on the outside of the tibial extremities.

The sexes of what I take to be *Ægeria gallivora* agree almost exactly in size and closely in ornamentation; the lower part of the front and a ring about the eyes milk white, above the white of the front shades into yellow, which extends about the first antennal joint, and is overhung by rather long blue-black scales, concolorous with the ground colour of thorax and abdomen; the palpi are yellow, blackish above; and the abdominal bands are two in both sexes, narrow in the male, the first narrow and the second broad in the female.

Although my material is scanty, I have reached the following conclusions regarding these gall-feeding and evidently inquiline species from

oak and hickory: *Hospes* is a good species, but what Walsh has said about the supposed female pertains to a species as yet unnamed; and *Gallivora* is now rescued from forgetfulness.

Ægeria pictipes, G. & R.—This moth is quite abundant throughout this district, and does serious injury to wild and cultivated cherry, as well as the plum. I have seen at least a score of pupal skins protruding from one tree at the same time.

Ægeria acerni, Clemens.—Great numbers of our maple shade trees are injured, often ruined, by this species. It is, however, rarely seen in the forest.

Ægeria tipuliformis, L.—The imported currant-stem borer is said to occur in Central Ohio. I have not yet taken it.

Ægeria lustrans, Grote.—I have two examples. The type was captured by G. R. Pilate near Dayton, O., and is said to be "common in one place." The food-plant is unknown.

Ægeria corni, Hy. Edw.—A moth taken at Sugar Grove, O., July 3, 1891, visiting the blossoms of basswood, I refer, with some hesitation, to this species. It resembles *Acerni*, but is smaller, and in every way more delicate. The agreement with Mr. Edwards's description of *Corni* (Papilio 1, 190,) is close, except the blackish third article of the palpi is not mentioned, and the underside of the caudal tuft is reddish orange or tawny, and not "bright orange." The expanse is 18 mm. instead of 15 mm.

Carmenta pyralidiformis, Walker.—Rare at Dayton. See List of G. R. Pilate, Papilio II., 65.

Albuna modesta, n. sp. I propose this name for a species taken on the University campus at Columbus in August last, resting on foliage. I have compared it with all of Mr. Edwards's descriptions of species in *Ægeria*, as well as *Albuna*, and examined as many of his types as I have been able to consult; also the species in the National Museum at Washington. I cannot recognize it among the descriptions or specimens.

The female has the head, thorax, abdomen and wings black above; the palpi are rather long, sordid white below and inwardly, blackish above and outwardly; the eyes are bordered by pale yellow scales; the antennæ are black, with a white patch on the upper posterior surface one-fourth the length from the tip; apical tufts black; thorax and abdomen without streaks or bands above, beneath both are paler, with a few yellow scales on the sides of the metathorax. The anterior vitreous space of

the fore-wings is small and triangular, the posterior one likewise small and oval; interveinular spaces of the apical patch golden; hind-wings with very narrow black border, fringes throughout blackish; beneath hind-wings as above, fore-wings yellow to the discal spot, with interveinular spaces beyond of the same hue. Fore-coxæ black, with pale scales, especially on lateral edges; femora black, with more or less pale; tibiæ black, with the spines and a few scales at tip sordid white; tarsi blackish, ringed with dull white; abdominal tufts slight, concolorous, with a few yellow points at base laterally.

Expanse, 18 mm.; length, 9 mm.

I have referred the moth to *Albuna* rather than *Ægeria* for the following reasons: 1, "the head is narrower than the thorax, which is not produced far beyond the base of the wings;" 2, "the antennæ are comparatively short," not reaching to the discal spot; 3, the legs are relatively short, on the other hand the tibiæ are not more than usually clothed with scales; 4, "the markings of the wings are heavy, the space between the submedian nervure and the inner margin is clothed with scales," except a minute clear space proximate of the clear triangle, and within the submedian; 5, the abdomen is fusiform without the apical brush.

The finding of the male may make the generic reference more certain.

BOOK NOTICE.

List of Lepidoptera of Boreal America, by John B. Smith, Sc. D., etc., Philadelphia, American Entomological Society, 1891.

Prof. Smith divides the Lepidoptera into seven suborders:—(1) The Rhopalocera, containing four families; (2) the Heterocera, containing twenty-three families, and comprising the Sphingidæ, Ægeriadæ, Thyridæ, Zygaenidæ and Bombyces of Grote's list; (3) the Noctuina, containing three families; (4) the Geometrina, containing the single family Geometridæ, divided into nine subfamilies; (5) the Pyralidina, containing seven families; (6) the Tortricina, containing three families; (7) the Tineina, containing twenty families. Prof. Smith has been assisted by Dr. Skinner in the Rhopalocera, by Dr. Hulst in the Geometrina and Pyralidina, by Prof. Fernald in the Pyralidina and Tortricina, while the entire list of the Tineina is by Dr. Riley. The list contains 6020 numbered species, which includes the unidentified species described by Walker (243 in number) and other authors (in all, 79 names).

There are a few inaccuracies and omissions among the Bombyces which I should like to notice :—

Family Nycteolidæ, page 23, add *Sarrothripa reveyana*, S. V. (See Hy. Edw., Bull. 35, U. S. Nat. Mus., p. 55).

Family Lithosiidæ, No. 966, *Nola minuscula*, Zeller, should have precedence as it was described in 1872 (Verh., d. k. k. Zool. Bot., Gesell. XXII., 455), while *fuscula*, Grt., was not described till 1881 (Papilio, I., 76).

Family Arctiidæ, p. 27, No. 1113*a*, *Arctia sciurus*, Bdv., is given as a variety of *Euchætes collaris*. Mr. Hy. Edwards once stated to me that it was the same as his *E. yosemite*. This would be a more probable synonymy, *sciurus* having precedence.

Family Liparidæ, p. 28, No. 1166, Walker's *clandestina* was referred to *Gluphisia* by Mr. Grote (CAN. ENT., IX, 21), but I do not know it, and it may really be *Dasychira*.

Family Notodontidæ, p. 30, add *Gluphisia avimacula*, Hudson. No. 1277 is the same as No. 1285, *Pheosia dimidiata*, H.-S, and I am of the opinion that *P. rimosa* and *P. californica* are synonyms of this. (See Psyche, VI., 194.) No. 1289, *Edema albicosta* is given as a synonym of *E. albifrons*. The forms can be distinguished, and I am not aware that they have been proven varieties. Nos. 1300 and 1302 are better referred to *Schizura* in my opinion. (See Psyche, VI., 177.) Page 31, No. 1339 is probably a synonym of No. 1345. No. 1342*a* is not a variety of *Cerura occidentalis*, but of *C. cinerea*. Perhaps I am responsible for this error, as my table in CAN. ENT., XXIII., 87, may be a little ambiguous, for I placed the var. *cinereoides* before *cinerea* instead of after it on account of the arrangement of the table. No. 1343, *C. scitiscripta* is given as a synonym of *C. cinerea*. This is surely a mistake. So far as I know it is a good species, and I have referred *candida*, Lint., as a variety of it, and not of *cinerea*, as it stands. *C. candida*. Lintn., has no affinity with *cinerea*, but the three forms, *scitiscripta*, *candida* and *multiscripta*, constitute a distinct group of the genus. Add *Cerura modesta*, Hudson.

Family Ceratocampidæ, p. 32, add *Dyocampa riversii*, Behr.

Family Bombycidæ, p. 33, *Hemileuca neumoegeni*, Hy. Edw., seems to have been overlooked. No. 1401, *Clisiocampa strigosa*, Str., is a synonym of *C. constricta*, Str. *Gastropacha aliescensis*, Pack., seems to be wanting. (See Stretch, Zyg. and Bomb., N. A., p. 113.) No. 1419½ should be *Thauma ribis*, to keep the original orthography. (See Hy. Edw., Proc. Cal., Acad. Sci., V., 265.) And, finally, *Eutheca mora*, Grote, has been left out. (See Bull., U. S. Geol. and Geog. Sur. Terr., Hayden, VI., 257.)

The list will be the standard for some time to come, and should be in the possession of every entomologist.

HARRISON G. DYAR.

Mailed February 6th.

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MISCELLANEOUS NOTES ON BUTTERFLIES, LARVÆ, ETC.

BY W. H. EDWARDS, COALBURGH, WEST VA.

1. An albino male *Colias Philodice.*

I received this example from Mr. H. E. Wilford, of Batavia, N.Y., last fall. Mr. Scudder, Butt. N. E., p. 1286, says:—"Instances of albinism are confined, so far as we yet know, to the *Rhodoceridi*" (which term he uses to include *Colias*, under his name of *Eurymus)*, "and to the female sex." In colour this male is white, with no tint of yellow; the borders of both wings are of median width, and solid—in all respects like the usual border of the yellow male. It was taken at Batavia last summer. Mr. Wilford wrote that at the time albino females were unusually plentiful.

2. An abnormal *Papilio Asterias.*

Mr. David Bruce sent me several larvæ of *Asterias* from Platte Canon, Colorado, 1st August, 1891, and I reared them to imago. One of these butterflies is a male by its body and claspers; female, by its wings. The male *Asterias* has two longitudinal abdominal rows of yellowish spots, sub-dorsal and lateral, and this example shows these rows, and no other yellow markings; the female *Asterias* has not only the same two rows, but a semi-row on either side the mid-ventral line on the three or four last segments. The hindwings are of the usual type of the female *Asterias*, and therefore without the mesial yellow band, which belongs to the male. The forewings are destitute of this yellow band, and also of the extra or discal row of yellow spots to be found in both sexes of *Asterias.* The submarginal row of yellow spots is present, but the spots are very small. So that the only yellow found on the forewing is in these submarginal spots. On the under side of the forewings, however, the extra discal spots are present, and the spots of the submarginal row are as large as is usual in female *Asterias.* Mr. Scudder says, p. 1759: "Specimens showing a mingling of the characters of the two sexes, called

gynandromorphs, are by no means unknown." He mentions seventy-one published examples of such, of which eight belong to the Papilioninæ: "most of these show complete bilateral distinction, the wings of one side being of one sex, of the other of the opposite sex. Dr. W. J. Holland writes me that he has a Papilio *Polyxenes*" (Mr. Scudder's name for *Asterias)* "collected by Mr. Mead, in which the abdomen is female, while the wings have the male colouring." The example I describe above is, then, just the reverse of the one in Dr. Holland's collection, the abdomen being male, the wings female. I hope to get this specimen, as well as the albino male Colias, figured in my Volume III.

3. *Papilio Bairdii.*

Mr. Bruce also sent me eggs of *P. Bairdii*, from West Colorado, in 1891, obtained by confining the female over the food-plant; and from these I reared several larvæ to pupa and imago. The butterflies in no way differed from the typical forms. The larvæ were distinctly different from the *Asterias* larvæ, which were feeding at the same time. I have the set of drawings of them by Mrs. Peart, and shall certainly figure the stages in Butt. N. A.

4. New species, *Papilio Hollandii.*

Mr. Bruce obtained in West Colorado three examples, male, of a *Papilio* wholly unknown to me, and which lies between the sub-groups of *P. Zolicaon* and *Asterias*. Like the species of the former sub-group, the abdomen is yellow. In all the members of the other sub-group the abdomen is black, with rows of yellow spots. The upper side of both wings in these examples is not distinguishable from the male *Bairdii*, the yellow bands and spots being of the same character, and the anal ocellus has its sub-oval pupil connected by a black ligament with the marginal stripe. On the under side the facies is quite different from *Bairdii*, by reason of the marginal yellow spots being very large and confluent; the spots of the mesial band very large, fully as much so as on the upper side. The abdomen is wholly yellow, except for a black dorsal stripe and four fine lines beneath, two on either side the venter.

It has been suggested that these might be hybrids between *Zolicaon* and *Bairdii*. I know nothing of hybrid butterflies, and if there is

positive evidence of such a thing in nature, I do not remember to have heard or read of it.*

It would not seem very likely that a colony of hybrids, so numerous as to allow of catching three individuals in one district, would be discovered. Now, I have a female Papilio, taken in Arizona years ago by one of the Wheeler expeditions, that must be of the same species as these males from Colorado. The hindwings are wholly wanting, but the forewings are good and agree with *Bairdii;* while the body is exactly like these males, allowing for the difference of sex. This specimen had always been a puzzle to me, and I looked for light on its peculiarities to come some day. I do myself a pleasure in naming this Papilio after my distinguished friend, Dr. Holland. Mr. Bruce will probably get eggs from the female of this species next summer.

*Under the heading of "Hybrids" in index to Butt. N. E., I find five pages referred to. On p. 283, we read "that hybrids occur between this species *(Astyanax*," (i.e. *Ursula)* "and *Archippus*" (i.e. *Disippus)* "is rendered probable by the remark of Mr. Mead, who found an *Astyanax* on whose upper surface the blue was supplanted by fulvous," etc.; and also of Grey, who says, CAN. ENT., XI., 17, he possesses "a melanitic form of *Disippus* with all the markings of *Ursula* on the under surface." Now these may be cases of hybridity, and may not. The American species of *Limenitis* are so closely allied that they would seem to be but one remove from a common parent, and as probably as not one of the black species is nearest that parent. These variations in occasional individuals of one species in the direction of another species may be cases of reversion or mere sports. Hybridity is conjectured, not proven.

On p. 289 et seq., is a discussion of the supposed hybridity by wholesale of Limenitis *Poserpina* (between males of *Arthemis* and females of *Ursula*, and *vice versa).* I have shown the improbability of this mixing up in CAN. ENT., XXIII., p. 49, et seq., and that all the phenomena may be accounted for in a different way, with no violation of probabilities.

On p. 445, we read: "Mr. H. Edwards describes a hybrid between Pyrameis *Atalanta* an i *Carye*:" "The under side is that of *Atalanta.*" Mr. Scudder adds here: "Hybrids among butterflies are of extreme rarity." Cases of copulation between butterflies of different species of the same genus have several times been observed and recorded, even of different genera. I reported one in C. E. recently between two of different families, viz., a Melitæa and Chrysophanus. But I do not know of instances (though such there may be) where such copulation has led to eggs from which the larvæ were bred to pupæ and butterflies produced. In only this way could we be sure of hybridity.

On p. 1212, we read that a Pieris *Rapæ* paired with a Pieris *Protodice* (these at least belong to different subgenera) and the female laid eggs which hatched. But the larvæ all died, and so nothing came of this conjunction.

On p. 1363, under Papilio *Asterias (Polyxenes)*, we are told: "No hybrids are known"; after which it is related that "Mr. Edwards possesses an hermaphrodite" specimen, etc. I conclude, knowing Mr. Scudder's habit of thorough research, that no other instances of possible or probable hybridity have been reported among American butterflies.

5. *Papilio Oregonia.*

Until recently this species was known only in east Washington and Oregon; but the late W. S. Foster, two years ago, took a fine example at Park City, Utah. Mr. B. Neumoegen has sent me for inspection a male taken somewhere in Utah. And, in 1891, Mr. Bruce found several examples in west Colorado. It is evidently a desert species, ranging from Washington to Arizona. In 1890, I had larvæ sent me from east Washington, believed to be of *Oregonia*. But, as they were found on the plants, the sender could not be certain. I saw all the stages from second to adult larva, and obtained one pupa. Of the last two larval stages, I have drawings made under the supervision of Prof. Riley. The larval markings and colours were unlike any Papilio larvæ I have known, and I think the species is certainly *Oregonia;* it can be nothing else, coming from that locality. But, as the pupa died before imago, I could not figure these stages on a plate as *Oregonia*. Now, I hope to obtain eggs and begin from that stage, and so get the set of drawings for publication.

6. *Anthocharis Sara* and *A. Reakirtii.*

On March 31st, 1888, I received eggs and larvæ (hatched on the way) of *Reakirtii*, laid 22nd inst. One larva passed first moult, 2nd April; second moult, 4th; fourth moult, 8th April, and pupated on 13th This pupa gave a true *Reakirtii* imago the next year, 12th April, 1889.

On June 4th, 1888, forty-three eggs laid by *Sara*, in confinement, were sent me by Mr. A. Koebele, but the plant with them rotted, and not more than two larvæ reached me alive on 11th. Mr. Koebele wrote that *Sara*, of May and June, proceeds from eggs laid by *Reakirtii* in March; but that some pupæ went over the winter to produce *Reakirtii* in the early spring; also that the product of *Sara* was *Reakirtii* of the next spring. The dimorphism is as that of Papilio *Ajax*.

It is very common for pupæ of Anthocharis to go over two winters Mr. Koebele wrote me, in 1888, that he then had pupæ of *Sara* and *Cethura* that formed in 1886, and one of the first named he sent me, labelled May, 1886. This, soon after I got it, gave imago *Reakirtii*. I have a living pupa now of *Genutia* of 1890, the only instance I have known in that species. *A. Ausonoides* passes two years in pupa sometimes. Both *P. Rutulus* and *P. Daunus* sometimes pass two years in pupa.

7. Caterpillars that go over two years.

I had a larva of Cœnonympha *Inornata* out of egg received from Mr. Fletcher, at Ottawa, go over two winters. Three larvæ hatched 18th August, 1888. One of these became lethargic after second moult and hibernated. On 6th May, 1889, it passed the third moult; the fourth, 9th June. In July was asleep again, and so passed the winter of 1890, and died in the following spring without further change. Others, of a lot from Montana, hibernated after second moult and pupated the following spring.

A similar habit has been noticed in Melitæa *Anicia*, Doubleday. This species is common on the tops of the highest peaks in Colorado, and so north to and beyond Laggan Until recently, the lepidopterists of this country were uncertain what *Anicia* was, and the name came to be applied to a rather large red species found in Nevada and California. But Mr. Henry Edwards, on his last trip to London, examined the type specimens in British Museum, and having with him several of his own Melitæas, identified the right one, and distributed examples of it to some of his correspondents. It is a small dark and dull species, and is said by Mr. Bruce to swarm in its localities.

I received eggs of *Anicia* from Mr. Bean, at Laggan, 5th July, 1889. The larvæ fed here on Pentstemon, and at once from the egg protected themselves under a common web. The first moult took place on 11th July; the second, on 14th; third, on 20th July; and in August all were asleep and were sent to Clifton Springs. They were received again, 2nd April, 1890, and soon began to feed. On 12th April several passed the fourth moult, and near the end of the month had gone to sleep again. Up to middle of September no change had taken place, but late in the fall they were found to be dead. In a state of nature these larvæ would pass the hibernating period on the ground among leaves and rubbish, but I could not attempt to imitate the conditions without certainty of mould, and so destruction. I wrote Mr. Bean about this experience, and he replied (last of Oct., 1890,):—"My four *Anicia* of 1889 still stay with me." Later, 17th Nov.:—"Two of the 1889 *Anicia* went into hibernation alive."

Whether any of the species of *Chionobas* in America require two years between egg and imago has not yet been ascertained. Mr. Scudder, Butt. N. E., is inclined to think *Semidea* has "a biennial cycle"; and

Mr. Fletcher, that *Macounii* (from Nepigon), has that habit. *C. Brucei*, allied to *Semidea*, has with me reached adult larva the first season, and probably the Colorado *Semidea* would behave the same way. But the conditions in Colorado, even on the highest peaks, are not so trying to insect life as on the White Mountains.

8. Food-plants of certain Colias larvæ.

The larvæ of *C. Scudderii* and *Nastes* feed on willow. I found those of the former would not touch white clover (or any clover) which the other alpine species, *Meadii*, *Elis*, *Alexandra*, eat; and it occurred to me to try willow. I gave them tender leaves of weeping willow, and they took to it at once. Mr. Bruce saw the female laying on a species of Vaccinium at Hall Valley, caught and confined her and got twenty eggs. He told me that he had often noticed the females flying in and out the dwarf willows as if laying eggs. I got the larvæ past second moult and then lost the whole of them.

As to *Nastes*, Mr. Bean, at Laggan, wrote:—"The larvæ feed on willow, and not mountain willow only, but from the banks of the Bow. I don't find any eating Vaccinium, but a lot on Hedysarum are doing well."

Messrs. Fletcher and Scudder obtained eggs of *C. Interior*, at Nepigon, and distributed part of them. I had fifteen or twenty, and they hatched; but the larvæ refused white clover and several other sorts of leaf which I tried them on, and all starved. I did not then know that willow was a food-plant of any Colias. Neither of the gentlemen named had better success than I had. Mr. Bean told me later that the food-plant of *Interior* was Vaccinium.

9. *Colias Meadii* and *Elis*.

These species, in their early stages, cannot be separated. The larvæ are precisely alike, even under the glass, so far as I have been able to discover, and they differ in appearance from all other larvæ of the genus observed by me, being thickly coated with short, black bristles, or stiff hairs. There is a basal stripe of pure white, with no red in it, and a sub-dorsal stripe of yellow-white. Many of the imagos of *Meadii* taken at Hall Valley and on the higher levels, in September and October, are very pale coloured (as to both the orange and black), and are undistinguish-

able from examples of *Hecla* from the Arctic Sea, except that the *Meadii* males (as well as *Elis*) have the mealy spot on costal margin of hind-wings, which *Hecla* shows nothing of. If a *Hecla* ever appeared with that spot, I should say the two were forms of one species.

I sent a pair of these to London to be submitted to two of the most experienced lepidopterists there, and asked them to tell me in writing what the species was. I gave no information about the pair, except that they were taken somewhere in America. Both the experts replied that the species was *Hecla*, but they noticed the presence of the mealy spot. In the museum collection, all the male *Hecla* were without that spot, and I cannot learn that it is known in any collection.

These pale examples are not worn but are fresh and evidently not long out of pupa. They must be the product of eggs laid by the earlier imagos the same season. Mr. Bruce wrote 7th Sept., 1890, that he had "just been up Gibson Mountain; elevation 14,000 feet; all barren and desolate. All I saw was two *Alexandra* and three *Scudderii*, half a dozen *Meadii*, a dozen *Arg. Eurynome*, and as many *P. Smintheus*. I send two of the *Meadii* to show you the colour." These were the first examples I had seen approaching *Hecla*, and on calling Mr. Bruce's attention to them, he presently took several others of same type about Hall Valley. That the imagos do sometimes come out the same season the eggs are laid, appears from my experience with larvæ at Coalburgh. On 23rd July, 1888, I received larvæ just out of egg from Mr Bruce; these passed the first moult, 27th; one passed the third moult 9th Aug.; the fourth, 14th; pupated, 19th; and the imago came out 25th August. The rest of the larvæ passed the third moult and hibernated. I sent them to Clifton Springs, N.Y.; got the survivors back in April following, and on 21st and 23rd April they passed the fourth moult; on 5th May one pupated, and gave imago 12th May.

In 1889, on 30th August, or five weeks later than in preceding year, I received eggs. Between the 23rd and 30th of September, all the larvæ were in hibernation after only two moults. The same year a second lot of eggs came 1st September. The larva hibernated after second moult.

In 1890 eggs were received 8th August; nearly all the larvæ hibernated after second moult, but a few went to third and one to fourth, but

all these died before reaching pupa. In all cases observed the larvæ hide themselves in and among the dead leaves at the base of the clover plant, and so hibernate.

Of *Elis*, I received from Mr. Bean, at Laggan, 23rd July, 1889, several larvæ just out of egg, the eggs having been laid 17th. They passed first moult 28th; second, 1st and 2nd August. On 12th one passed third moult. In all, six got through third moult, and shortly after went into hibernation, and were sent to Clifton Springs. Two came back alive 2nd April, 1890, and they passed fourth moult 12th and 14th April. One passed the fifth moult on 24th; was sent to Mrs. Peart, at Philadelphia, and pupated there 4th May; was mailed to me and never arrived. The other larva died before pupa.

On 20th and 22nd July, 1890, eggs and larvæ just out arrived. Nearly all the larvæ hibernated after second moult, but two reached fourth by 20th August. One of these died shortly after that, the other went on to the end of the stage; changed colour for pupation, and then died. But I concluded from this that in native conditions some *Elis* must reach imago the same year in which the eggs are laid, as with *Meadii*.

On 24th May, 1891, I received six larvæ from Mr. Bean which had hibernated at second and third moults. They were sent just as they were taken out of the snow, and were but half awake when I received them. Had not suffered on the journey, though sealed up in a piece of cork and six days on the way. From these were obtained three imagos, 1 ♂ and 2 ♀ ♀, on 28th and 29th and 30th May.

To me *Elis* is a very puzzling species, exceedingly close to *Meadii* in some examples, but considerably different in others. Mr. Bean, who lives in the *Elis* district and has caught multitudes of them and bred from the egg many, is fully of the mind that the species is distinct; and I defer to his judgment.

[TO BE CONTINUED.]

PAMPHILA MANITOBA, SCUD., AND ITS VARIETIES.

BY H. H. LYMAN MONTREAL.

In 1874 Mr. Scudder published his paper on "The Species of the Lepidopterous Genus Pamphila" in the Memoirs of the Boston Society of Natural History, in which the following species were described as new:—Nevada, Colorado and Manitoba, and Sassacus; Ottoe, Juba, Comma of Europe, and Sylvanoides were also treated of.

None of the descriptions are detailed, but are altogether comparative, pointing out the differences between the closely allied forms, and in the case of Manitoba the comparisons instituted are exclusively with the European Comma. The four specimens, 2 ♂s and 2 ♀s, illustrated, are all from the west of the continent, or rather, I should say, from the west and centre. One specimen was from Lake Winnipeg, one from Colorado, and two from British Columbia. The figures show specimens of which the underside of secondaries is dark greenish or greenish-brown, and with considerable variation in the prominence or restriction of the markings.

Though no figure of any eastern specimen is given it is stated in the text that the species had been taken at Riviere du Loup by Mr. Couper.

Since then it has been repeatedly taken on the Lower St. Lawrence by other collectors at Cacouna and Rivière du Loup, Metis, and even as far as Gaspé by myself in 1888.

The form found on the Lower St. Lawrence is very uniform in colour and has the outer third of the underside of the forewings and the whole of the underside of the hindwings, with the exception of the inner margin and hind angle, of a dark brown colour, though occasionally with a slightly greenish tinge.

In 1890, on returning east from a trip over the Canadian Pacific Railway, I stopped for a day at Regina, the date of my visit being August 5th, and as usual devoted a good part of the day to collecting Lepidoptera. Among other things, I collected a good series of males of a Pamphila of the Manitoba group, which was new to me, but only succeeded in securing one female, it apparently being a little early for that sex. During October of that year I paid a flying visit to New York and Boston, taking a few specimens with me for comparison, among them a specimen of this skipper, which I showed to Mr. Henry Edwards, who

said that he did not know it, and thought it must be new. Mr. Scudder said it might be new, but one needed a very full series in that group. I afterwards showed it to Mr. Fletcher, and asked him if he had ever seen that form, and he immediately said "Yes, at Regina." He added that he had sent a specimen to Mr. Eugene Aaron, who had pronounced it to be only Manitoba, but Mr. Fletcher expressed to me the opinion that it was at least a very distinct variety. The point in which this form chiefly differs from Manitoba of the Lower St. Lawrence is that those parts on the underside, which are brown in the latter, are of a very pale greenish-yellow or yellowish-green in the Regina form, but it also differs somewhat above in that the males are usually of a yellower tone while the brown of the female is decidedly darker and the spots of the forewing decidedly lighter, some of them being almost white, than in the Eastern specimens.

Wishing to get further light upon the probable relationship of these forms this year, I took a number of specimens of each with me on a trip to Boston and New York before returning home from a short holiday on the Atlantic Coast, and through the kindness of Mr. Scudder was enabled to examine his original types of Manitoba. One of these agreed exactly with my specimens from the Lower St. Lawrence, while the ones from British Columbia and Colorado were greener, but none agreed with, or even approached the average of the Regina specimens. Mr. Scudder, however, on account of the close similarity of the markings, seemed to be of opinion that the Regina form must be a variety of Manitoba. At New York Mr. Neumoegen kindly allowed me to compare my specimens carefully with the Pamphilas in his magnificent collection, but no specimen was found which at all agreed with the Regina form, and Mr. Neumoegen expressed the opinion that I should be safe in describing it; but in order to guard against all danger of being accused of rashness, I took the specimens out to New Brunswick, N. J., to Prof. J. B. Smith, who very kindly, at my request, dissected the male abdominal appendages of one of the Regina specimens, which upon examination were seen to be practically identical with the illustrations of those of Manitoba, drawn by the late Mr. Edward Burgess, and published by Mr. Scudder. The form would therefore seem to be only a variety of Manitoba, but Prof. Smith expressed the opinion that it might very properly receive a varietal name as a distinct geographical race. Mr. Scudder, however, in his "Butterflies of New England" would seem to

have adopted this form as the basis of his description of Manitoba, as he describes the underside of the hindwings as being, except for the markings, "almost uniformly greenish-yellow," although he has no specimen of the Regina form in his collection.

I am, however, strongly of opinion that the difference between the Eastern specimens and those from Regina is sufficiently great to be worthy of being indicated by varietal names, and if the name Manitoba is to be restricted to the dark-brown or greenish brown specimens, as I believe it was originally applied, I would suggest the name, var. Assiniboia, for the light greenish-yellow Regina form. If, however, it is preferred to call the latter Manitoba, I should suggest the name, var. Laurentina, for the dark-brown form of the Lower St. Lawrence.

NEW SPECIES OF PYRALIDÆ.

BY GEO. D. HULST, BROOKLYN, N. Y.

Myelois fructetella, n. sp.—Expands 16–18 mm. Head dark fuscous; maxillary palpi fuscous, becoming black on end member. Antennæ and thorax fuscous-gray to dark fuscous; abdomen yellowish-fuscous, ringed with dark fuscous on anterior part of each segment; forewings light gray, heavily marked with fuscous and black; base to basal line, with black scales, which become very heavy within basal line along inner margin; middle field much darkened on posterior half, with fuscous continuing along both lines, broad and black at costa along basal line, and narrow and black at costa along outer line; outer field broadly black along costa outside of outer line, becoming lighter posteriorly and along outer margin; fringe very light gray; basal line white, straight in direction or somewhat dentated, near middle distinct; outer line less distinct, with a large but not deep sinus outwardly at middle; hindwings translucent fuscous becoming darker at edges.

I have four specimens—all females—from Arizona and Texas. The insect very much resembles dark specimens of *Mineola juglandis*, Le Baron.

Myelois elegantella, n. sp.—Expands 29 mm. Gray, more or less

overlaid with black scales. Forewings, lines white, distinct, edged narrowly on both sides with black, the basal line well out from base with two dentations inwardly at middle, the outer line with a strong subcostal dentation, then finely serrated till near inner margin. The gray of the ground colour is at places much overlaid with the black scales, becoming very distinctly black at middle of basal space, across the middle field and along outer border. The outer edge is black broken by the fine, light gray lines of the veins. Hindwings translucent fuscous, darker on outer edge and with a fine black border line.

The aspect of the insect is much like that of a *Salebria*. Seattle, Wash.

Myelois texanella, n sp.—Expands 19 mm. Head, thorax and forewings light gray, composed of chalk white with a light mixture of dark scales. Forewings with a blackish space at extreme base near middle; lines faint but distinct, the inner slightly bent near costa, slanting thence outwardly to inner margin, the outer angulated outwardly at middle, rounded inwardly below costa, somewhat dentate above inner margin, outer margin with a series of black triangular points, two black superimposed discal points; all lines white, narrowly edged with black; hindwings translucent fuscous. Blanco Co., Central Texas.

Myelois leucophaeella, n. sp.—Expands 22 mm. Head, thorax and forewings uniform dull fuscous-gray; lines of forewings distinct but not sharply defined, both dull white, the basal running obliquely outward from costa with two large dentations, the outer well towards outer border, evenly and sharply dentate below the middle. Hindwings even dull fuscous. Iowa.

Acrobasis cirroferella, n. sp.—Expands 18 mm. Head light gray in front, otherwise fuscous; palpi light gray, dark on last segments; antennæ light gray at base, beyond fuscous. Thorax dull fuscous. Forewings dull fuscous gray, lighter and clearer along costa, on basal and median spaces; ridge of basal scales black, preceded by gray, not extending to costa; a black line begins at costa just above scale ridge, and bending evenly outward and downward, follows then to costa parallel with the scale ridge; outer line very close to border, very nearly lost in the general fuscous colour, but most distinct costally, and only slightly bent medianly in its course. Abdomen fuscous, segments lined. Austin, Texas.

Salebria levigatella; n. sp.—Expands 28 mm. Head and thorax blackish. Forewings smooth, of an even fuscous, the costa more rounded than usual, basal space to basal line of a dull red colour, lines indistinct, the basal faintly discernible, dentate, the outer very faint or entirely obsolete. Hindwings fuscous, darker outwardly. Amherst, Mass., from Dr. C. H. Fernald; also from Wisconsin.

Salebria purpurella, n. sp.—Expands 27 mm. Face and palpi gray, mixed with black; the summit of head stained with reddish. Thorax and abdomen fuscous, with reddish stain. Forewings gray, heavily washed with reddish-purple, the gray being more clear before basal line and along costa before outer line. Basal line near base, apparent only on posterior half, lined on each side with black; outer line very faint and indistinct close to margin. Hindwings fuscous, tinged slightly with reddish near anterior angle. New Mexico.

Zophodia bella, n. sp.—Expands 28 mm. Head and palpi fuscous-gray; thorax fuscous; abdomen fuscous; the segments lighter posteriorly. Forewings gray, clear along costa, washed with fuscous behind subcostal vein, this running in longitudinal lines on the veins and interspaces, being especially distinct on the veins. Basal line suggested by diffuse blackish spots; outer line quite indistinct, oblique from costa, then strongly dentated; a subterminal line of diffuse black spots; two discal dots black, diffuse, the anterior more distinct. Hindwings light fuscous with marginal black line. Massachusetts.

Ocala, n. gen.—Labial palpi long, porrect; maxillary palpi distinct, pencil tufted; tongue long, antennnæ bent above base with tuft of scales in bend; forewings 11 veins, 4 and 5 stemmed, 10 separate; hindwings 7 veins, 3 and 4 stemmed, 5 wanting. Abdomen in ♂ tufted. Very near to *Dolichorrhinia*, Rag., and differing principally in the presence of the pencil tufted maxillary palpi and tufted abdomen.

Ocala dryadella, n. sp.—Expands 18 mm. Palpi and head fuscous gray, thorax light fuscous or dirty white, abdomen same colour with heavy anal tufts beneath and on sides in male; forewings fuscous gray, basal line well out near middle of wing, faint, edged outwardly with diffuse broken black, outer line close to margin, indistinct, rounded, serrated; two black discal dots, very small; a comparatively large, oval black spot on basal space near basal line just above inner margin. Hindwings translucent, light fuscous.

Charlotte Harbor, Fla. From Mrs. A. T. Slosson to whose kindness I am indebted for many favours, and to whom I give my grateful thanks.

Diviana nymphælla, n. sp.—Expands 21 mm. Palpi very long, much exceeding head, the second member especially being lengthened, dark fuscous, whitish in front. Head blackish fuscous, collar blackish. Thorax dull gray. Abdomen lightish gray. Forewings fuscous gray lines indistinct, the basal indicated by a deepening of the dark colour on either side, outer line near outer edge and parallel with it; discal spots distinct geminate, a marginal line of black spots. Hindwings light fuscous. Charlotte Harbor, Fla., from Mrs. A. T. Slosson.

It was my intention to erect a new genus *Palatka* for this species, more especially on account of the very long erect labial palpi, but I have concluded to place it under *Diviana*, which it nearly approaches. I mention this, as I gave the MS. name, *Palatka*, to Dr. J. B. Smith, and on this account the species stands under that generic name in his lately published "List of Lepidoptera."

Chipeta, n. gen.—Labial palpi long, slender, arched on second member, horizontal at end, 2nd member very long, end member short; maxillary palpi small, ocelli distinct; antennæ crenate pubescent. Tongue short, but not obsolete. Forewings long, narrow, oval, 9 veins 5 and 8 wanting, 3 and 4 separate, 10 separate. Hindwings 7 veins, 2 at angle, 3 and 4 stemmed, 5 wanting, 8 distinct. Near to *Tampa* Ragonot; the generic name from Chipeta, wife of Ouray, Chief of the Ute Indians. In Dr. Smith's List of Lepidoptera the genus is under the name *Osceola*, but that is preoccupied, so I change it to *Chipeta*.

Chipeta perlepidella, n. sp.—Expands 22 mm. Palpi, head and thorax dark red. Abdomen yellowish fuscous, with a reddish tinge. Forewings with costa narrowly white, the line not reaching apex, the rest of the wings bright reddish, quite even in colour. Hindwings white, narrow; pointed. Fla.

Lipographis subosseella, n. sp.—Expands 16 mm. Head, thorax and forewings of a dull white colour, rather evenly washed with light fuscous, giving a dirty white appearance, and this all sparingly mixed with blackish scales; line of forewings indistinct, shown rather by a darkening of edges which give a blackish blotch by basal line near inner margin and an even subterminal dark rather broad band. Two discal dots also indistinct. A marginal line of indistinct black dots. Hindwings fuscous, darkest at

edges. Abdomen light fuscous, the segments blackish dorsally, especially anally, the extreme end yellowish. Bahama Is. West Indies.

This species, while not North American, is described, as I have given it to Mr. Ragonot under this MS. name. The generic reference is by Mr. Ragonot.

Paralipsa decorella, n. sp.—Expands 27–30 mm. Palpi and head whitish, collar whitish, thorax light gray, abdomen fuscous gray, antennæ whitish at base becoming fuscous outwardly; forewings gray costally, gray washed with fuscous posteriorly; lines quite indistinct, the basal near middle of wing and strongly dentated, the outer scarcely evident; a black stripe from base at middle reaching out to basal line and much broadening there, forming a diffuse blackish spot along costa towards apex, and the marginal space much stained with dark fuscous; a black marginal line, fringes fuscous. In some specimens there is on the basal and middle fields a faint reddish shading, especially posteriorly. Hindwings light fuscous, beneath nearly even fuscous on all wings. Along costa in ♂ there is concealed a very large tuft of cottony hair, the hair being nearly a quarter of an inch in length, very fine and very dense.

My specimens are from Buffalo, N.Y., and London, Ontario.

Loxostege baccatalis, n. sp.—Expands 22–24 mm. Palpi rather short, dark buff in colour stained with blackish beneath on first and second segments with rather long pure white scales. Front and antennæ buff, slightly stained with blackish; the clypeal tubercle broad, conical, not much extended. Thorax whitish below in front, dull golden yellow above, sometimes slightly shaded with fuscous. Forewings dull golden yellow generally, somewhat washed with fuscous, a little more decidedly on the central field; lines as such indeterminate. On each wing are three sets of dull white spots, all edged with blackish, the outer and inner sides being the heavier, and these in part at least being the broken remnants of the cross lines. All the spots are behind the subcostal space, and in each case the anterior spot begins on that space. The first set is basal, the anterior spot being oval-triangular on outside of basal line, and the posterior larger, quadrate, on the inside of the basal line, not extending beyond the middle of wing. The second set is discal, the anterior quadrate oval, representing the discal spot, the posterior larger, quadrate reaching to vein 1. The third set is on the outer line, the anterior largest of all the spots, quadrate, on inner side of the line. The next is below on outside of line, made into two or three

by the veins, which are fuscous, flattened basally, rounded conical outwardly, the dark edging forming rounded dentations. The third spot is inside the line, posterior to the last, subquadrate rather large, reaching vein 1. Hindwings yellowish, becoming quite whitish translucent basally, and on middle field cross lines quite distinct, the first near the middle, the outer not far removed, and having at the middle three white spots long oval, divided by the veins, and strongly edged all around with blackish. Wings beneath as above, less sharply determinate in markings, the yellow more whitish and more washed with fuscous. Abdomen yellowish, with a narrow line, more whitish on each segment. In the male the abdomen is slender, extended, the genital armour protruded, and with a long tuft of hair on either side of last segment. Blanco Co., Central Texas. Specimens taken in April, July, September and October. The single specimen taken in April is darker than the rest, and there is some variation among all in the size of the whitish spots. The generic reference is from Dr. Smith's new List of Lepidoptera, and so on Dr. Fernald's authority.

NOTES ON NORTH AMERICAN TACHINIDÆ, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.—Paper V.*

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

The Tachinidæ herein described and mentioned are from the more northern parts of the U. S.; from Colo., Kan., Dakota, Iowa and Minn. to Ills., Mich., Pa., N. Y., N. H. and D. C.

Blepharipeza bicolor, Mcq.

A small specimen from Dixie Landing, Va. (D. C.), Sept. 21, is evidently this species. It measures 9 mm.

Blepharipeza exul, n. sp., ♀.

Eyes light brown; frontal vitta light brown, with a reddish tinge; sides of front cinereous; face and cheeks silvery; facial ridges bristly half way up, sides of front bristly, sides of face bristly below frontal bristles; antennæ blackish, first two joints and base of third rufous, arista blackish; third antennal joint little more than twice as long as the

* Paper I. was published in Proc. Ent. Soc., Wash., II.; papers II. and III. in Trans. Am. Ent. Soc., XVIII. and XIX.; paper IV. in Ent. News, III.

elongate second joint; proboscis blackish, labella large, brownish; palpi rufous black bristly, rather stout; occiput silvery-gray, hairy. Thorax blackish, faintly silvery-pollinose, with five narrow black vittæ, the outer pair obsolete in front; scutellum brownish-rufous, as is also the thorax on hind margin and sides posteriorly. Abdomen dark rufous, a median broad vitta and posterior margins of segments black. Legs black, tibiæ rufous, femora silvery on outside, especially front ones; claws and pulvilli somewhat elongate, the pulvilli tawny-whitish. Wings grayish-hyaline, yellowish-brown at base; hind cross-vein strongly sinuate; tegulæ brownish-fuscous, halteres tawny-brownish.

Length of body, nearly 10 mm.; of wing, 9½ mm.

Described from one specimen; New Hampshire (C. W. Johnson).

This species differs from *B. adusta* principally in the rufous basal joints of antennæ, the rufous tibiæ, and the brownish wing bases and tegulæ. Seven specimens from N.Y. (Comstock) are perhaps this species. They are 10–13½ mm.; the antennæ are black, inclining to rufous at base; the frontal vitta dark brown; the cheeks, sides of face and front much less bristly. The females have two orbital bristles, and the males have the claws well elongated.

Gonia sagax, n. sp., ♂.

Eyes brown; front almost one-half width of head; sides of face, cheeks and whole front, including frontal vitta, light golden-yellow; facial depression silvery-white and about two-fifths width of face; vibrissæ decussate, inserted a little above oral margin; sides of face, cheeks and front covered with bristly hairs; antennæ nearly as long as face, second joint rather short, third about five times as long as second, first two joints same pale yellow as front, third joint clear orange-rufous; arista brown, second joint distinctly longer than last joint; proboscis black, tip and base brownish; palpi yellow, curved and thickened at tip; occiput blackish, except vertical area yellow, thickly clothed with yellowish-gray hair. Thorax shining metallic-black, posterior corners and margin and scutellum testaceous, scutellum with four pairs of macrochætæ besides a discal pair. Abdomen shining black, bases of segments two to four silvery-white, or slightly golden in some lights, most broadly on anal segment; first and second segments with a lateral macrochæta and a median marginal pair, third with eight or more marginal, anal with several macrochætæ. Legs black, foot-claws and pulvilli nearly as long

as last tarsal joint, pulvilli smoky. Wings grayish-hyaline, costo-basal portions broadly yellowish; tegulæ nearly white, halteres brownish-yellow.

Length of body, 10½ mm; of wing, 7½ mm.

Described from one specimen; Ames, Iowa (Osborn).

Pseudogonia ruficauda, n. sp., ♂.

Eyes light brownish; front more than one-third width of head, frontal vitta dark brownish; sides of front brassy-golden, face and cheeks silvery-white, epistoma yellowish, antennæ and arista deep black, first two antennal joints rufous; proboscis black, tip and base brownish, palpi pale rufous; occiput cinereous, thickly yellowish-gray, hairy. Thorax black, silvery-pollinose, leaving four black vittæ, humeri and pleuræ silvery with a brassy tinge; scutellum testaceous, somewhat silvery. Abdomen black, first segment slightly silvery behind, second and third segments more or less thinly and anal segment thickly brassy-pollinose, tip of anal segment rufous; first segment with one lateral macrochæta, second with one lateral and a median marginal pair, third with a marginal row of ten or twelve, anal with a marginal row of about as many; hypopygium black, hairy. Legs black, front femora thick silvery on underside, all femora bristly, middle and hind tibiæ with strong macrochætæ, claws and pulvilli elongate, pulvilli tawny-fuscous. Wings grayish-hyaline; veins on costo-basal portions, also middle portion of marginal cell, pale yellowish; tegulæ white, halteres fuscous.

Length of body, 11 mm.; of wing, 8 mm.

Described from one specimen; Brookings, So. Dakota (J. M. Aldrich).

I refer this species to *Pseudogonia*, Br. & v. Bgst. The second antennal joint is elongate, third two and a half times as long as second; arista geniculate, second joint elongate; sides of face bristly, as in *Cnephalia* and *Gonia*, but the second aristal joint less than half as long as third; proboscis longer than height of head, slim; palpi long, slender basally, thickened apically.

A ♂ specimen from N. Y. (Comstock) differs chiefly in the anal segment being wholly black at tip, not at all rufous; the third antennal joint blackish, rufous at base, arista brown. If these differences are, as I believe, entitled to specific value, the species may be known as *P. obsoleta*. It is 11 mm. long.

Siphoplagia anomala, Twns., Trans. Am. Ent. Soc., XVIII, p. 350.

This species was described from Southern New Mexico. A ♀ specimen from So. Ills. (Robertson) proves to be the same species. It is 8 mm. long.

Plagia americana, v. d. Wulp, Biol. C.-A. Dipt., II., p. 102, pl. 3, f. 19.

A specimen from N. Y. (Comstock) agrees with v. d. Wulp's description in all except that the third vein of the wing is bristly only to small cross-vein, not beyond it. The wing, however, differs from the figure in the origin of the hind cross-vein being considerably below instead of opposite the small cross-vein. I am unwilling to consider it a distinct species without further proof, as it otherwise agrees so closely with the description, though the difference in venation can hardly be varietal.

Plagia aurifrons, n. sp., ♂.

Eyes light brown; frontal vitta and sides of front golden, insensibly shading on sides of face into the silvery of the face and cheeks; front one-third width of head; three orbital bristles, the hindmost one weaker, frontal bristles descending about half way down sides of face; antennæ and arista black, the second antennal joint silvery, the third twice as long as second; proboscis brownish; palpi yellowish rufous, blackish at base; occiput cinereous, gray-hairy. Thorax black, slightly silvery, with five more or less distinct blackish vittæ, the middle one obsolete anteriorly; scutellum black, more or less silvery. Abdomen shining black, bases of segments two to four broadly but faintly silvery, the silvery becoming most distinct when viewed very obliquely; first segment with a lateral macrochæta and bristles, second with a lateral one and median marginal pair; third with about eight marginal, the median two more removed from margin; anal with a median discal pair, a sub-marginal sub-lateral pair, and a marginal row. Legs black, femora and front tibiæ silvery on outside, claws and pulvilli elongate, the pulvilli smoky whitish. Wings grayish-hyaline, yellowish-fuscous along veins on costal half, first vein bristly its whole length, third bristly to small cross-vein, fourth vein with slight wrinkle at bend; hind cross-vein nearly parallel with inner-margin of wing, but its origin considerably behind the point opposite small cross-vein; tegulæ whitish; halteres pale rufous, blackish in middle.

Length of body, 7 mm.; of wing, 5⅔ mm.

Described from one specimen; Pennsylvania, June 4 (Johnson).

Trixa gillettei, n. sp., ♂.

Eyes brownish; frontal vitta brown, narrowed posteriorly; front very narrow behind, wide before; face, cheeks and sides of front silvery-pollinose, latter shading to darker, cheeks with a brown area anteriorly; antennæ and arista blackish, first two antennal joints and base of third rufous; second antennal joint bristly, with a long bristle on front edge, third joint as long as second; proboscis as long as height of head, rather slim, blackish; palpi slender, brownish, rufous at tip, bristly; occiput silvery, clothed with yellowish hairs. Thorax black, slightly silvery, with four (?) indistinct black vittæ; scutellum black, slightly silvery. Abdomen black, more or less deeply silvery-pollinose according to lights, except first segment; first two segments with a lateral pair of macrochætæ, and a median discal and marginal pair; third with a median discal pair, and a marginal row; anal with a more or less regular discal and marginal row. Legs black, claws and pulvilli very elongate; pulvilli tawny-fuscous, claws brown at base, black at tips. Wings grayish-hyaline, tawny at base, without costal spine; tegulæ nearly white, halteres rufous or brownish.

Length of body, 10 mm.; of wing, 9 mm.

Described from one specimen; Colorado (C. P. Gillette).

This species differs from both of Mr. v. d. Wulp's Mexican species described in the Biologia Centrali-Americana, *T. obsoleta* and *T. differens*, by having discal macrochætæ on the abdomen.

Miltogramma kansensis, n. sp., ♂.

Eyes light reddish-brown; frontal vitta nearly obsolete, concolorous with front; sides of front, face and cheeks silvery white, the front shading to dark, epistoma and facial depression more or less yellowish; three orbital bristles, continued in front by a row of minute bristles; antennæ orange rufous, third joint about one and a half times as long as second, arista black; proboscis elongate, fully as long as height of head, rather slender, black, base and tip brownish, labella developed; palpi elongate, yellow, filiform, hardly at all thickened; occiput cinereous, black hairy. Thorax silvery, with three blackish median vittæ placed closely together, the middle one obsolete in front, and two heavier vittæ outside them; scutellum black, silvery pollinose. Abdomen red, a median triangle on first segment and a large triangle extending from median portion of base of second to posterior lateral corners of third segment black, anal segment

black; second and third segments silvery-white pollinose basally, anal segment wholly so; first two segments without macrochætæ, third and anal with a marginal row. Legs black, femora silvery on outside, claws and pulvilli quite elongate, latter tawny. Wings almost hyaline, tegulæ white, halteres pale yellowish.

Length of body, 8 mm.; of wing, 5⅓ mm.

Described from one specimen; Kansas, June.

Metopia luggeri, n. sp., ♀.

Eyes light brown; front extremely prominent, frontal vitta obsolete before, blackish behind, the sides of front abruptly black behind and pure silvery-white before; face and cheeks silvery-white; antennæ and arista black, third antennal joint very long, fully five times as long as second, nearly reaching epistoma; proboscis blackish, labella brownish, palpi black; occiput cinereous, thinly black-bristly. Thorax black, thinly silvery-white pollinose, with four black vittæ; scutellum black, slightly silvery. Abdomen black, almost wholly silvery-white pollinose, except first segment and hind margins of others; first two segments with a median marginal pair of macrochætæ, and some lateral bristles; third segment with a lateral pair and a median marginal pair; anal segment with a marginal row. Legs black, femora more or less silvery-pollinose, claws and pulvilli very short. Wings grayish-hyaline, tegulæ whitish, with rust-yellow borders, halteres rufous.

Length of body, 5½ mm.; of wing, 4½ mm.

Described from one specimen; Minn. (Lugger).

Thryptocera americana, n. sp., ♀.

Eyes bare, light brownish; front about one-third width of head, frontal vitta light yellowish; frontal bristles descending a little below base of antennæ, four posterior pairs directed backward, two orbital bristles; face, cheeks and sides of front silvery-white, the sides of face extremely narrow, the facial ridges bare except a few bristles next vibrissæ, the latter quite strong and inserted exactly on oral margin; antennæ as long as face; third joint very wide, rounded, and about two and one-half times as long as second, first two joints light rufous, third joint light brown; arista somewhat rufous, brownish at tip, more or less geniculate, 3-jointed, second joint elongate; proboscis short, fleshy, pale yellowish, labella large; palpi pale yellow, rather long, curved, thickened distally; occiput cinereous above, pale yellowish below, sparsely bristly. Thorax

silvery cinereous, with two narrow concolorous median vittæ reaching scutellum, humeri and pleuræ silvery-white; scutellum pale testaceous. Abdomen pale yellowish rufous, silvery-pollinose, with a median black vitta which widens over most of third segment and all of anal; second segment with a lateral macrochæta and a median marginal pair, third and anal segments with a marginal row; venter pale yellowish at base, darker toward anus. Legs pale yellowish, tarsi blackish, femora and tibiæ hairy and slightly bristly; claws and pulvilli very short. Wings grayish-hyaline; first, third and fifth veins spined their whole length, except tips of two latter; apical cell narrowly open exactly in tip of wing, fourth vein roundly curved at bend, hind cross-vein slightly nearer to small cross-vein than to bend of fourth; tegulæ nearly pure white, halteres yellow.

Length of body, 4 mm.; of wing, 3½ mm.

Described from one specimen; Washington, D. C., August.

Myobia diadema, Wd.

Mr. v. d. Wulp (Biol. C.-A. Dipt., II.) describes this species as having the epistoma "slightly prominent". A ♂ specimen from N. Y. (Comstock), which I refer to this species, has the front golden like the thorax, the face silvery, and the oral margin or epistoma is what I should call "very prominent".

[TO BE CONTINUED.]

GETTING BUTTERFLY EGGS.

BY W. G. WRIGHT, SAN BERNARDINO, CAL.

It is generally understood, I believe, that to get eggs the requisite plant must be also enclosed in the gauze bag with the female insect. Such is often, but not always the fact, and it will lighten the labours of the biologist and simplify his methods if a more correct statement be made. That one genus of butterflies should not use or require living plants to receive their eggs, while others will fret and die without ovipositing if their peculiar plant be withheld, indicates a relationship, or gives a hint as to grouping of genera upon natural lines. But if so, it plays havoc with existing groupings, and will cause the arbitrary to give place to the natural when these things become better understood.

The genera of butterflies, with the living forms of which I am acquainted, and of which the females do not require plants in ovipositing, are as follows:—Parnassius, Argynnis, Euptoieta, Neonympha, Cœ-

nonympha, Hipparchia, Satyrus, Chionobas, and in part, Chrysophanus. Females of all other genera, so far as I know, will die rather than oviposit when their respective plants are not present, and it is necessary also that the plants be bright and fresh ; when even slightly wilted the insects will ignore them, and die without ovipositing.

Having thus stated the matter generally, let me now give more in detail the habits of some typical species of both groups as to ovipositing, and my experiences in getting eggs from them. *Parnassius Hermodur*, when ovipositing, alights upon the ground among the grass and crawls about in a restless way at random, dropping egg after egg as they mature indiscriminately upon the bare ground or dead rubbish or wherever they may chance to fall. When thus engaged she is as readily approached as if feeding on flowers. When tne ♀ is confined in a bag she is not unruly but remains rather quiet, scattering her eggs about, singly, as they ripen, and most of the eggs attach to the gauze of the bag, to which they adhere but slightly. I have never observed ovipositing of *P. Smintheus*, but believe it to be identical with *Hermodur*, as related. The habits of all the other genera named are the same in this particular, that the eggs are laid singly, and not in masses, as is the habit of some genera.

Different species of Argynnids have different methods of ovipositing, but none that I know of require a plant. *A. Callippe* goes crawling about on the ground and under bushes like a Parnassian, and oviposits by extending the abdomen down among the dead twigs and dry leaves like a grasshopper. This habit renders the species somewhat difficult to manage in a bag, as the eggs will be pushed down into the ground if possible. Other species, as *Semiramis*, oviposit on the wing without ever alighting, but hovering over suitable places and dropping the eggs at pleasure. The reason for this peculiar habit seems to be to avoid small lizards, which abound and which are alert to seize any flying insect. *Semiramis* is a difficult species to manage in confinement. Lively, vigorous and restless, they take confinement hardly. When ovipositing in a gauze bag they drop the eggs at random, and only a few become attached to the gauze, but most of them drop to the bottom, where they are likely to be lost unless precaution be taken. *A. Leto* also oviposits on the wing. In 1890 I took a fine ♀ *Leto* near Mt. Shasta, in northern California, and as I was on my journey southward and could not well wait to get eggs in the usual way, I put her in a small tin box without any food or plant except a few blades of grass to

serve her as a foothold, and putting the box in a hand-grip carried it home, a distance of 900 miles, and with stops taking five and a-half days. Upon reaching home I opened the box, gave *Leto* sun and air, then fed her with sweetened water, then put her in gauze bag in the open window without any plant in sight or other thing which could remind her of the home she had left so far behind, and she lived several days and gave me a nice lot of fertile eggs. This *Leto* was not fractious, but as she had been shut up in a dark box nearly a week it could hardly be called a fair test. *Leto*, of all Argynnids, is a strong and tireless flyer, vigorous and full of life and activity, and seldom at rest. It is, therefore, but reasonable to suppose that they would rebel if confined. I have had other ♀ Letos in confinement, but out in the open country, and unattended, so that I could not watch them.

Cœnonymphas are very gentle and tractable. They worry but little, and remain very quiet. As the eggs mature and become ready to deposit they are stuck on to the gauze singly, adhering rather firmly. These eggs are rather small, but are safely taken in a coarse netted bag, as they are coated with a glutinous substance, by which they adhere at once to any fibre, and so do not fall away and get lost. The greatest difficulty I have had with Cœnonymphas is in the matter of shade. A little too much shade and she will not lay her eggs ; a little too much sun and she incontinently dies. A piece of thin muslin makes a better shade than a leafy twig.

One would think from the Ornithoptera-like shape of the wings of *Chionobas* that they were of rapid flight, wild, and generally unreasonable. But such is not the case. They are very gentle, flying about but little, and usually returning to the spot they started from, where they settle down again slowly and deliberately. I have found *C. Gigas* to be easily handled in captivity, and have got eggs without difficulty. In the interior of Vancouver Island I took a ♀ upon the top of a high hill, and immediately put her in a bag and laid it down on the grass by the side of a big rock where it would be sheltered from the cold wind, and with no shade from the sun, as it was not hot at that height, and did not go to it again for thirty-six hours. Then, when I went to it I was delighted to see some eggs sticking to the gauze. I could not remain any longer, nor could I return another day. So I took a small tin box and carefully put the bag, insect, eggs and all together in it and tied it to my belt for safety in going away through several miles of dense thicket, and so carried it to my hotel,

and thence by rail to Victoria. There I removed the eggs already laid, and placed the bag in the sun in the open window, staying the gauze with pins to keep it steady in the breeze, and so I got another lot of eggs in the middle of the city and without plant or other accessory

Of genus *Chrysophanus* I can speak but with some doubt. Some of the species, as *Gorgon* and *Xanthoides*, appear always to oviposit like the Argynnids upon the ground or among dry rubbish, while *Helloides* always uses a plant, Polygonum aviculare, or in Alaska, where this polygonum does not grow, on some allied plant.

It is thus seen, in short, that these enumerated genera of butterflies which require no plant are most of them easy to manage, and that they can be safely and readily carried a long distance alive and well, and eggs afterward obtained at the home of the student, with little trouble; and that course I advise in all such cases. On the other hand those butterflies which require a plant on which to deposit their eggs are more difficult to handle, because you have not only the butterflies to manage but must provide a fresh plant as well. Yet the difficulties are not so great as is feared. I have found it best, usually, when a suitable ♀ is caught, to tie the bag at once upon a living plant, and then put in it the ♀, and arranging suitable shade leave it for a day or two. These plant-loving butterflies all lay their eggs upon the plant, and not upon the bag, except accidentally. Ants, birds and boys must be guarded against—a trio of terrors. I do not use a large bag; one large enough to hold a quart or two is large enough, either with the plant or without. It is not best that the butterfly should be able to fly about and flutter in its bag; they become much more quiet and reasonable in a small one.

The plant problem is often the one most difficult of solution. Cuttings from delicate plants and such as speedily wilt and perish, can be carried home in a tin box in which they will keep fresh for several days. In that way I have gotten eggs and raised larvæ in my laboratory when the plants grew ten miles away, by going once a week for fresh cuttings. But some cuttings wilt immediately if exposed to the air. To avoid this, put the cuttings into a glass fruit jar, then put in the ♀ and shut it up tight. The closing of the jar prevents the plant from wilting, and by that method I have had good success in getting eggs, notably from the large *Papilio Rutulus*, and in raising larvæ. This *P. rutulus* gave me no end of trouble to get eggs in the open air, but oviposited freely when shut up with willow twigs in a half-gallon fruit jar.

When you know months beforehand what plant you will require, it is best to transplant them to your own grounds, and so have them at hand fresh and growing. By such means I have successfully handled, both for eggs and for larvæ, such species as *Colias eurydice* and *Lycæna sonorensis*, both of which species it would seemingly have been impossible to manage otherwise.

Breeding is the touchstone which tests all species of butterflies, and by it must they all stand or fall. The larva is as much the individual life as is the imago, and we cannot thoroughly know a species unless we have seen its earlier as well as its later stages. Therefore anything which simplifies the management of the early stages is of interest to the biologist.

CORRESPONDENCE.

PROF. J. B. SMITH'S LIST OF LEPIDOPTERA.

Dear Sir: Prof. French in the January number criticises in some points Prof. Smith's catalogue of the Catocalæ in the New List of Lepidoptera. As I was primarily responsible for the list of the Catocalæ, will you and Prof. French kindly allow me an explanation? 1st. Prof. French says "var. *Virens* is not a variety of *Cordelia*, Hy. Edw., but of *Amasia;* and *Cordelia* is not the one figured by Dr. Strecker, pl. 9, f. 12." But *cordelia*, Hy. Edw., is a synonym of *amasia*, Ab. & Sm., and Dr. Strecker's figure is not *amasia*, Ab. & Sm. The error comes from the fact that Abbott & Smith figured two species as ♂ and ♀ of *amasia*, the description being of the upper one only. The insect represented by the lower figure of Abbott & Smith was distributed by Mr. Grote, and figured by Dr. Strecker as *amasia*. Of course the name attaches to the figure described, as afterwards Guenee located it, calling the lower figure *connubialis*. The lower insect I afterwards described as *sancta*, regarding Guenee's name as without authority, as the description was from a picture. Whether I was right or not I will not here say, but the insect distributed by Mr. Grote, and figured by Dr. Strecker as *amasia*, is either *connubialis*, Gn .,or *sancta*, Hulst; while the *amasia* of Abbott & Smith is the *cordelia* of Hy. Edwards, as Mr. Edwards afterwards acknowledged to me. *Virens* was put as a variety of *amasia*, Ab. & Sm., because Prof. French thus located it, and I supposed he meant *amasia*, Ab. & Sm. 2nd. Prof. French says "there is no good reason for separating the two forms of *retecta*." I am not sure what he

means by the "two forms of *retecta*;" but if he means *retecta*, Grt., and *luctuosa*, Hulst, then, in view of what he says after, *luctuosa* becomes a variety of *retecta*, Grt. 3rd. Prof. French says "*Flebilis* is not a variety of *retecta*," etc. "Dr. Strecker's figure, pl. 9, f. 4, is not *flebilis*, but a small form of *Desperata*," etc. Dr. Strecker does not call figure 4 *flebilis*, but a variety of it. It is, however, except in the black dashes, as near as can be the exact counterpart of pl. 9, fig. 3, which is *flebilis*, taken from Mr. Grote's type. Also these two, save in the black dashes, are the counterparts of pl. 9, fig. 2, which is *retecta*, and which is from Mr. Grote's type. Having seen the types of both *retecta* and *flebilis* I can bear witness that the figures are very excellent. Mr. Grote had among his types of *retecta* one or more specimens of *luctuosa*, Hulst, but his description is of the form figured by Dr. Strecker. 4th. I am glad to learn more of *Ululume*, Streck. I have seen the type, have one of the specimens from which the description was made, and so know the insect. At the time of publishing my synopsis in the Brooklyn Bulletin, Vol. VII., 1884, pp. 13–56, I regarded it as a variety of *lacrymosa*, as did also Dr. Strecker. Let me add that very few of all the so-called varieties of the U. Catocalæ are varieties in the scientific sense. They are simply colour variations, and the continuance of their names is, in the majority of cases, only a convenience, and without scientific authority. GEO. D. HULST, Brooklyn, N. Y.

SECTION F OF THE A. A. A. S.

Dear Sir: In the January (1892) number of the Botanical Gazette, Dr. B. D. Halsted, Secretary of Section F of the Association, suggests the formation of a Botanical Section, to be separated from Section F. This is a matter in which entomologists have some interest, and concerning which it might be well to have an expression of opinion. All who have attended recent meetings of the American Association must have noticed what a remarkable development of interest there has been in both botany and entomology, and how crowded were the programmes, not only of Section F, but of the Clubs. At the Washington meeting the writer was on the Sectional Committee, which passed on the papers offered, and even after excluding all of doubtful value or interest, it left so many that a proper presentation was out of the question. A most interesting series of papers on parasitism in insects was read at breakneck speed, and not a word of discussion was allowed. I myself had three papers, for which I had prepared charts in illustration, and which

presented the results of original work. I barely had time to hurry through the abstracts, and could not even explain my charts. The botanists occupied fully one-third of the time of Section F, and had a large programme for the Club besides. The entomologists had many papers before the Club which were well worthy of presentation to Section F. Botany is quite sharply separable, has a sufficient number of members to present a full programme as a section, and would leave Section F for zoology in general with more time for the proper discussion of papers. As matters now stand, papers are grouped—botanists desert Section F when entomological papers are read, and entomologists usually do as much when botanists hold forth. In the orderly evolution of the Association botany is entitled to a separate section, and entomologists should aid the botanists in securing the necessary action at the next meeting.

JOHN B. SMITH, New Brunswick, N. J.

NOTES.

ADDITIONAL NOTE ON AMBLYOPONE PALLIPES, HALD.

On page 138, Vol. XXIII., is mentioned the finding, in rotten logs, of colonies of this species. The fate of the specimens taken on 30th April may be related. Unfortunately the individuals then taken were not counted, but they consisted of workers and larvæ, the latter being more numerous. The box was examined on 1st June and it was found that many of the larvæ had formed cocoons, and that the remainder were feasting on a green caterpillar, which had been dragged down into the nursery. The larvæ were thickly scattered over it, evidently sucking the juices from it, and it was much shrunken. On 21st June another examination was made and a census taken of the inhabitants, which numbered 27 adults (all workers), 23 pupæ (in cocoons) and 48 larvæ. There were also a number of empty cocoons. On 5th July the numbers were reduced to 23 workers, 11 cocoons and 15 larvæ, and, what was a surprise to me, about 30 eggs, cylindrical in shape, with rounded ends and about twice as long as wide. On 13th July there were 23 workers, 7 cocoons, 13 larvæ and about 15 eggs. When I left home shortly after this the box was placed outdoors, and during my absence the insects all died or wandered off. I was disappointed in not obtaining specimens of the ♀ and ♂, and regret that the colony was not housed so that continuous observations could have been made of the inmates and the doings.

W. HAGUE HARRINGTON, Ottawa.

Mailed March 9th.

The Canadian Entomologist.

VOL. XXIV. LONDON, APRIL, 1892. No. 4.

NOTES ON NORTH AMERICAN TACHINIDÆ, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.—PAPER V.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

Loewia ruficornis, n. sp., ♂.

Eyes cinnamon brown; frontal vitta brown, much narrowed posteriorly, front at narrowest point about one-half its width at vertex; sides of front, sides of face and facial depression black, thinly silvery-pollinose; cheeks blackish posteriorly, thinly silvery, the pregenal area very broad, brown, extending upward between sides of face and facial depression; antennæ and arista rufous, third antennal joint little more than one and a half times as long as second, with a somewhat darker shade on outer side; proboscis brownish, palpi rather fuscous, tips rufous; occiput black, black-hairy. Thorax and scutellum shining black, black-hairy and bristly. Abdomen shining dark metallic-green; second segment with a median marginal pair of macrochætæ, third with six or more marginal, anal with about six marginal; hypopygium rather exserted, concolorous. Legs black, knees slightly rufous, front femora bristly; claws and pulvilli elongate, pulvilli smoky-whitish. Wings slightly grayish, nearly hyaline, costo-basal portion and veins golden; tegulæ rather smoky-golden, translucent; halteres clear yellow.

Length of body, 6½ mm.; of wing, 5½ mm.

Described from one specimen; Constantine, Mich., August 27. This species seems to connect the genera *Loewia* and *Ennyomma*. The species of *Loewia* usually have the eyes contiguous in the male, while in this species they lack considerably of meeting, and the apical cell, though it cannot be said to be open, is rather widely closed in margin, if the expression may be allowed. In *Ennyomma* the apical cell is open.

Loewia nigrifrons, n. sp., ♂.

Differs from *L. globosa* Twns. (Ent. News, III.) as follows: Sides of front and sides of face shining black, not silvery; facial depression slightly silvery; pregenal area light-brownish; proboscis and palpi blackish.

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W. HA

Mailed March

boscis short, fleshy,
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men wholly shining
pair of bristles, a
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lateral marginal ones,
gment with a discal
k, claws and pulvilli
stal border yellowish,
apical cell closed in
nearer curve ; tegulæ

Robertson).

light brown ; apparently
stles ; sides of front shining
ck, thinly silvery, epistoma
slight greenish lustre, hairy,
brownish prægenal area ;
nal joints rufous, third joint
moderately wide ; proboscis
lum and abdomen dark metallic
nal macrochæta ; second with a
nd a median discal and marginal
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teres brownish.
ings, 3⅔ mm.
N. Y. (Comstock).

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gs in *Phytoinæ*. Head in general profile
rofile sinuate in outline, bulging above.
row in ♂, the eyes closely approximated in

Wings smoky golden, all except internal border; tegulæ golden fuscous, halteres concolorous.

Length of body, 5 mm.; of wing, 4½ mm.

Described from one specimen; So. Illinois (Robertson).

Ennyomma clistoides, Twns. Trans. Am. Ent. Soc., XVIII, p. 371.

A ♂ specimen from So. Dakota (Aldrich), August 12. Measures 7½ mm.

Clista americana, n. sp., ♀.

Eyes brown; frontal vitta dark brown, blackish, averaging one-third width of front, front averaging one-third width of head; sides of front, sides face and facial depression black, thinly silvery-pollinose; cheeks posteriorly black, thinly silvery, rest included in the large brown pregenal area, an angle of which runs upward between sides of face and facial depression; sides of face fringed with bristles on inner border, cheeks on lower border; antennæ entirely rufous, third joint about twice as long as second, arista brownish; proboscis and palpi brown or blackish, the proboscis fleshy, not as long as height of head, the palpi curved and thickened at tip; occiput black, black-hairy. Thorax and scutellum shining black, the thorax in front slightly silvery, leaving three black vittæ which become lost near suture. Abdomen shining black, with a hardly greenish reflection, broad, flattened, rounded; first two segments with a lateral and a median marginal pair of weak macrochætæ; third with about eight marginal, and anal about six marginal macrochætæ of normal size. Legs black, claws and pulvilli only a little elongate, pulvilli smoky-yellowish. Wings grayish-hyaline, base and veins yellow; tegulæ brassy-yellow, front scales white on outside, the rest transparent; halteres yellow, tinged with rufous toward base.

Length of body, 6½ mm.; of wing, 5½ mm.

Described from one specimen; So. Illinois (Robertson).

Tryphera americana, n. sp., ♀.

Eyes bare, brownish; front more than one-third width of head, frontal vitta velvety brown; frontal bristles descending to base of third antennal joint, vertical bristles strongest, and with three next pairs directed backward, two orbital bristles; sides of front shining black; facial depression and sides of face black, somewhat silvery, epistoma pale luteous; cheeks shining black, anteriorly somewhat rufous; facial ridges bare; vibrissæ decussate, inserted on oral margin; antennæ rufous, more or less blackish, third joint blackish-brown in some lights, fully two and one-half times as long as second, somewhat widened; arista brown, 3-jointed, often some-

what geniculate, second joint slightly elongate; proboscis short, fleshy, dark brown; palpi yellow, a little thickened at tip; occiput shining-black, somewhat bristly. Thorax, scutellum and abdomen wholly shining greenish-black, scutellum with a weak apical decussate pair of bristles, a sub-apical decussate (?) pair of macrochætæ, and two lateral pairs. First abdominal segment with one or more lateral macrochætæ; second with a lateral marginal one, a lateral discal pair, a median discal and a median marginal pair; third with a lateral discal pair, three lateral marginal ones, a median marginal and a median discal pair; anal segment with a discal row and a few marginal macrochætæ. Legs black, claws and pulvilli short. Wings grayish-hyaline, basal portion and costal border yellowish, with small costal spine, third vein bristly at base; apical cell closed in tip of wing, fourth vein curved, hind cross-vein nearer curve; tegulæ pale tawny, halteres brownish.

Length of body, 3½ mm.; of wing, 3 mm.

Described from one specimen; So. Illinois (Robertson).

Tryphera polidoides, n. sp., ♀.

Eyes light brown, thinly hairy; frontal vitta light brown; apparently three orbital bristles amongst other weaker bristles; sides of front shining black; sides of face and facial depression black, thinly silvery, epistoma paler; cheeks and occiput shining black, with slight greenish lustre, hairy, cheeks bordered anteriorly with a narrow brownish prægenal area; antennæ and arista black, first two antennal joints rufous, third joint about three times as long as second, moderately wide; proboscis brownish, palpi yellowish. Thorax, scutellum and abdomen dark metallic green; first segment with a lateral marginal macrochæta; second with a lateral discal and marginal one, or pair, and a median discal and marginal pair; third with a lateral discal and median discal pair, and a quite distinct marginal row; anal with a discal and marginal row. Legs blackish, claws and pulvilli only a little elongate, pulvilli tawny-whitish. Wings slightly grayish, nearly hyaline, veins yellow, third vein spined at base; tegulæ dull whitish, translucent; halteres brownish.

Length of body, 5⅓ mm.; of wings, 3⅔ mm.

Described from one specimen; N. Y. (Comstock).

CLISTOMORPHA, n. gen.

Much the general form of *Clista*, but greatly resembling *Hyalomyia* in the form of the head. Belongs in *Phytoinæ*. Head in general profile triangular, the fronto-facial profile sinuate in outline, bulging above. Front not prominent, very narrow in ♂, the eyes closely approximated in

front of ocelli but not contiguous, front a little widened at vertex, more so at base of antennæ, face widening at same angle, about one-half width of head at widest which is the lowermost portion; frontal bristles weak, in single row, terminating at base of antennæ, directed forward and inward, decussate, except vertical bristles which are directed backward and hardly stronger than the others; no orbital bristles (♂). Face not receding, rather advancing, nearly perpendicular, epistoma prominent, oral profile long; facial depression about four-fifths width of face, rather triangular in ouline, very shallow; facial ridges bare except some very small bristles just above vibrissæ, only a very little constricted a good distance above oral margin where the weak non-decussate vibrissæ are situated, the latter being distinct from the shorter bristles below which make up the uniform row on the cheek borders; sides of face very narrow, bare; cheeks very narrow, bare. Eyes bare, descending far below vibrissæ and about as low as oral margin. Antennæ inserted nearly on a line drawn through middle of eyes, short, about three-fifths length of face, third joint hardly longer than second, elongate-round; arista bare, apparently only 2-jointed, basal joint short, terminal joint thickened at base. Proboscis nearly as long as height of head, rather slender, labella somewhat developed; palpi small, slender, filiform, but slightly thickened at tip. Thorax not so wide as head; scutellum with an apical decussate, and two lateral pairs of macrochætæ. Abdomen rather wider than thorax, much rounded, somewhat flattened, but convex above, first segment not shortened; macrochætæ weak, discal and marginal; hypopygium concealed. Legs not long, not stout, very little bristly, claws and pulvilli of ♂ only a little elongate. Wings much longer than abdomen, without costal spine, third vein without bristles at base; apical cell closed in border at tip of wing, fourth vein curved, apical cross-vein nearly straight; hind cross-vein nearly straight, about in middle between small cross-vein and bend of fourth. Type *C. hyalomoides*, n. sp.

Clistomorpha hyalomoides, n. sp., ♂.

Eyes cinnamon brown; frontal vitta velvet-black, narrowed posteriorly; sides of front, face and cheeks silvery-pollinose; antennæ and arista blackish, second antennal joint more or less brownish; proboscis brown, palpi pale tawny; occiput black, silvery below. Thorax soft black, humeri broadly silvery-cinereous, continued backward on sides of thorax to scutellum, pleuræ silvery; scutellum black. Abdomen black; second segment narrowly at base and with median line, third more broadly at base and broadest on sides and in middle, and anal almost

wholly except tip, silvery cinereous ; macrochætæ weak and more or less bristle-like, first segment with a median marginal pair, second with a median discal and marginal pair, third with a median discal pair and a marginal row, anal with a marginal and two discal rows. Legs blackish, femora more or less brown, claws and pulvilli but little elongate. Wings grayish-hyaline, very faintly tawny at base, veins brownish; tegulæ smoky yellowish-gray ; halteres rufous, knobs flesh-coloured.

Length of body, 5½ mm.; of wing, 4½ mm.

Described from one specimen ; N. Y. (Comstock).

Phyto senilis, n. sp., ♂.

Eyes brown ; frontal vitta velvet-blackish ; sides of front black, more or less silvery-pollinose ; face and cheeks blackish, silvery-pollinose ; antennæ and arista blackish, first two antennal joints rufous, sometimes also base of third ; third joint hardly one and one-half times as long as second ; proboscis brown, palpi yellow ; occiput blackish, black-hairy. Thorax and scutellum shining black, with an opaque more or less distinct median pair of vittæ lost at suture. Abdomen black, hairy ; first three segments with a marginal row of macrochætæ, anal segment tipped with weaker ones ; hypopygium rather exserted. Legs black, femora hairy, tibiæ bristly, claws and pulvilli elongate, pulvilli tawny fuscous. Wings grayish-hyaline, basal portions and veins pale tawny ; costal border of wing swollen on second costal cell, costa drawn in at termination of auxiliary vein ; tegulæ whitish, margins yellow ; halteres blackish.

Length of body, 6½ mm.; of wing, 5½ mm.

Described from one specimen ; N. Y. (Comstock).

Macquartia johnsoni, n. sp., ♂.

Eyes light brown, rather thickly hairy ; frontal vitta black, about one-third width of front, narrowing behind as front grows narrower, the front about one-third width of head before ; frontal bristles strong, not descending below base of antennæ, three posterior pairs directed backward, decussate except second pair divergent, others directed forward and decussate ; two orbital bristles ; vertex golden ; sides of front, face and cheeks silvery-white, not hairy nor bristly ; facial ridges bare, vibrissæ strong, decussate, inserted on oral margin ; antennæ blackish, first two joints and base of third rufous, third joint about two and a half times as long as second ; arista blackish, pubescent basally ; proboscis blackish, labella and palpi rufous yellow ; occiput silvery or brassy pollinose, golden above, thickly gray hairy. Thorax brassy-golden pollinose, with two median vittæ which

become obsolete about half way between suture and scutellum, and a heavier lateral vitta which is interrupted at suture; scutellum brassy pollinose. Abdomen shining black, bases of second to anal segments broadly silvery pollinose with a brassy tinge, also sides of first segment; first segment with a lateral macrochæta and bristles, and a median marginal pair; second with a lateral one, and a median marginal and discal pair; third with a median discal pair and a marginal row of about eight; anal segment with a discal and marginal row. Legs black, tibiæ rufous, bristly, femora silvery on outside, claws and pulvilli quite elongate, pulvilli yellowish. Wings grayish hyaline, tegulæ whitish, halteres yellowish.

Length of body, 8½ mm.; of wing, 7 mm.

Described from one specimen; Penna. (C. W. Johnson).

Polidea americana, n sp., ♂.

Eyes nearly black, pubescent; frontal vitta black, one-third width of front, front one-third width of head; one orbital bristle on left side, none on right; frontal bristles descending below base of third antennal joint; sides of front shining dark green as far down as lowest frontal bristles; sides of face and facial depression silvery-pollinose; cheeks and occiput shining dark green; antennæ and arista deep black, third antennal joint wide, two and a half times as long as second; proboscis brownish, palpi pale rufous, darker at base. Thorax, scutellum and abdomen dark metallic green; first segment with a lateral marginal macrochæta amongst other bristles; second with a median discal and marginal pair, and a lateral marginal and discal one, or pair; third with a median discal and lateral discal pair, and a marginal row; anal with a discal and marginal row; hypopygium somewhat brownish. Legs black, knees hardly rufous, claws and pulvilli only a little elongate. Wings slightly grayish, nearly hyaline, veins yellow, third vein spined nearly or greater way to small cross-vein; tegulæ nearly white; halteres rufous, knobs black.

♀. Differs as follows:—Frontal width about the same, two orbital bristles (only one on right side in one specimen); third antennal joint not widened. Claws and pulvilli not quite so long; front tarsal joints widened.

Length of body, ♂ 6 mm., ♀ 5½ to 5⅔ mm.; of wing, ♂ 4 mm., ♀ 4⅓ to 4½ mm.

Described from one male and two females; Constantine, Mich., August 24. I have also a ♂ from Orono, Maine (Harvey), which I doubtfully refer to this species. It has no orbital bristles, and the apical cell is very narrowly open. It measures 5⅓ mm.

CLERCK'S ICONES.

BY W. J. HOLLAND, PH.D., D.D.

Under the title "*Icones Insectorum Rariorum cum Nominibus eorum trivialibus, locisque e C. Linnæi Arch: R: et Equ: Aur: Syst: Nat: allegatis,*" Charles Clerck, a member of the Royal Academy of Sciences of Upsala, commenced the publication at Stockholm, in the year 1759, of a series of plates intended to illustrate the species of exotic lepidoptera recently named by his distinguished fellow-countryman, the immortal Linnæus.

About a month ago I received from Mr. Felix Dames, the well-known bibliopole of Berlin, a letter informing me that he had succeeded in securing a remarkably fine copy of this exceedingly rare work, which he held at my disposal. I immediately cabled to him that I would become its purchaser. But six or seven copies of the book are known to be in existence, and not all of these in perfect state. The one I own, which has just come into my hands, and which is the only copy which has ever crossed the Atlantic, is in superb condition, and enjoys the distinction of being, with the exception of the copy in the library of the Royal Academy of Sciences at Stockholm, the only example in which there are the plates, so far as published, of the Third Section of the work which Clerck did not live to complete. He died on July 22nd, 1765.

Hagen, in his Bibliotheca Entomologica, states that the work consists of two sections, the first of which, in addition to the title page and dedication, has eight pages of Swedish and Latin text, together with sixteen plates; and the second, in addition to the dedication, contains three pages of text, thirty-eight plates, and an index of three pages. The copy lying before me contains, in addition to the parts described by Hagen, seven plates, numbered from 4 to 10, of which the first two are coloured, and the next to the last (pl. 9) is partly coloured.

The extreme rarity of the book is well known to lepidopterists. Gottlob Wilhelm, in his "Unterhaltungen," Ins. II., page 16, published in 1779, is quoted by Strecker in his "Butterflies and Moths of North America," p. 218, as having described the work in the following terms:— "Fifty-five pages large 4to, a simple register, together with a dedication and preface, compose the whole work, which, at auction, was sold for 600 Swedish dollars." Hagen tells us that the book was distributed by the Queen of Sweden in the form of presentation copies, and that it

was never put upon the market, and hence became scarce. Linnæus, in his Systema Naturæ I., ii. p. 535, speaks of it in laudatory terms as "*Clerckii icones insectorum, pulcherrimum opus, quod etiamnunc vidit orbis literatus.*" Prof. Zeller, in the Stettiner Entomologische Zeitung, Vol. XIV., p. 199, after describing at length the longing desires he had felt to get a glimpse of the work, and how at last, through the kindness of Alexander von Humboldt and the Librarian of the Royal Library at Berlin, the wish had been gratified, and how it happened at the same time that he was allowed the use of a mutilated copy belonging to Dr. Herrich-Schaeffer, of Regensburg, goes on to state his disappointment with that part of the work which is devoted to the illustration of the European Geometridæ and Pyralidæ. He says:—"*Welches war aber der Eindruck, den das pulcherrimum opus, als ich es nun endlich vor Augen hatte, auf mich machte? Hatte ich auch keine Bilder wie in* British Entomology *oder wie in der* Exploration Scientifique de l'Algerie *erwartet, so wusste ich mir doch nicht sogleich Rechenschaft zu geben, wie Linné so jaemmerliche Malereien fuer etwas so Herrliches erklaeren konnte. Das ergab sich denn wohl, dass nicht die Abbildungen Europaeischer Nachtfalter sodern die der grossen, bunten Exoten Linnés Augen bestochen und ein so viel sagendes Urtheil hervorgerufen hatten.*" While it is undoubtedly true that the figures of the smaller forms are measurably disappointing, and are not to be for a moment compared with the splendid productions which have come to us in recent years from the press of Europe and America, yet as a whole they compare very favourably with the illustrations given in many of the works of the older authors. They are equal to those given in Drury's illustrations, and are vastly superior to the great majority of the figures given by such an author as Cramer. Zeller calls attention to the fact that there are differences in the two copies which he had under his eye at the time he wrote his critique, due to the work of the colourist. The uncoloured plates in the copy before me explain the manner in which these variations came to take place. The figures prepared by the engraver were simply outlines done in copperplate, and all of the shading, as well as the colouring, was left to the artist who wielded the brush, and who can have had nothing to guide him in his work except the original drawings, or the insects themselves. Under the circumstances it is very plain that minor discrepancies must have inevitably occurred.

The North American insects figured in the work are the following:—

Papilio glaucus, *P. asterias*, figured under the name *P. Ajax*, *Victorina steneles*, *Colœnis dido*, *Gyœncia dirce*, figured under the name *Papilio bates*, *Agraulis vanillæ*, *Danais plexippus*, *Deiopeia ornatrix*, *Samia cecropia*, *Pachylia ficus*, *Erebus odorata*, *(sic)*, *Actias luna*, *Nyctalemon lunus*. The latter is common in Jamaica.

The insects figured in the supplementary plates which are found in my copy, and to which there is no reference made by Kirby in his Synonymical Catalogue, are the folllowing :—

PLATE 4.

Fig. 1,	*Papilio (Argynnis) niphe.*	2 figs.	Upper and lower sides.	
" 2,	" *(Precis) almana*, vera.	2 figs.	"	"
" 3,	" *(Grapta) c-aureum.*	2 figs.	"	"
" 4,	" *(Junonia) œnone.*	2 figs.	"	"

PLATE 5.

Fig. 1, *Papilio (Danais) plexippus.*	2 figs.	Upper and lower sides.	
" 2, " *(Danais) chrysippus.*	2 figs.	"	"
" 3, " *(Precis) almana*, XXX.	2 figs.	"	"

(This is the wet season form known by authors as *P. asterie*, L.)

" 4, *Papilio (Neptis) leucotoe (sic).* 4 figs. Upper and lower sides.
(Athyma)

(The two left hand figures represent *Neptis leucothoe*, and the two right hand figures represent *Athyma perius*, which has been confounded by synonymists with the preceding species, which in turn has been unaccountably given by Kirby, who refers to Cramer's figure as a synonym for *N. aceris*, Lep. *Neptis leucothoe*, figured in Cramer, and in the unedited plate of Clerck, whose figure is a good one, is a Celebesian insect.)

PLATE 6.

(Uncoloured.)

Fig. 1,	*Papilio Demoleus.*	2 figs.	Upper and lower sides.	
" 2,	" *Ægistus.*	2 figs.	"	"
" 3,	" *(Delias) pasitea (sic).*	2 figs.	"	"
" 4,	" *(Terias) hecabe.*	3 figs.	"	"

(Two forms of this species are given, one with the black marginal border not quite as broad, nor as deeply sinuate inwardly as the other.)

PLATE 7.

(Uncoloured.)

Fig. 1, *Papilio (Melanitis) leda.* 4 figs. Upper and lower sides.

(The two upper figures represent the form in which the falcation of the primaries is most noticeable, and in which the outer margin of the secondaries is freely produced at the extremity of the third submedian. It may be that the figure was drawn from an African specimen, in which case the form *Banksia* is probably intended to be represented. The lower of the two figures represents a smaller form in which the falcation of the primaries is scarcely perceptible, and the secondaries are rounded posteriorly and not produced. I have such specimens of *Leda* in my collection from Perak and from Kumaon.)

Fig. 2, *Papilio (Precis) lemonias.* 2 figs. Upper and lower sides.
" 3, " *(Mycalesis) mineus.* 2 figs. " "
" 4, " *(Cynthia) alimenia.* 2 figs. " "

(This is not *Hypolimnas alimena*, of which a good figure is given on plate 32, but undoubtedly represents *Cynthia deione. Alimenia*, Clerck, must therefore be added to the synonymy of that species. Fig. 5 unnamed, but easily recognizable as *Junonia atlites.)*

PLATE 8.

(Uncoloured.)

Fig. 1, *Papilio Memnon.* 2 figs. Upper and lower sides.
" 2, " *(Euplœa) midamus.* 4 figs. " "

(The two lower figures may represent *E. midamus*, but they have not the exact form of that species, and are too large. There is nothing but an outline. The two upper figures seem to represent *E. Core.)*

PLATE 9.

(Partly Coloured.)

Unnamed, but a fairly good figure of *Attacus atlas.*

PLATE 10.

(Uncoloured.)

Fig. 1, *Papilio Agamemnon.* 2. figs. Upper and lower sides.
(The tailed form of this species.)

Fig. 2, *Papilio*, unnamed.

(The cuts represent the upper and under sides of a specimen of *Papilio Antiphates*, Cram., the tails of which have been cropped off with a scissors. The outline faithfully reproduces the mutilation, so as to render it recognizable by any one familiar with the species.)

Fig. 3, *Papilio panope*. A good outline of the upper and under side of this species.

The only commentary upon the Icones of Clerck which I have been able to find is embodied in the papers of Prof. Zeller, alluded to already in this article, and a paper by Herr Wernebufg, published in the Stettiner Entomologische Zeitung for the year 1856, in which the writer undertakes to solve some of the problems as to synonymy, which he regards Prof. Zeller as having left untouched. These all, however, as the comments of Prof. Zeller likewise, relate to the European micro-lepidoptera figured in the work. I may at a later date furnish a paper upon the synonymy of the exotic micro-lepidoptera, in regard to which plainly something remains to be said.

Chancellor's Office, Western University of Pennsylvania.
Feb. 2, 1892, Pittsburgh.

HERMAPHRODITE GYPSY MOTHS.

BY C. H. FERNALD, AMHERST, MASS.

Two specimens of this moth (*Ocneria dispar*, L.) were taken in Medford, Mass., last summer, which are what Ochsenheimer called perfect Hermaphrodites. One is much larger than the other, having an expense of 52 mm., and has the right half of the body, with the wings and antennæ of that side, of the form, colour and markings of the female, while the left side of the body, with its wings and antennæ, are male. The other example has a wing expanse of 39 mm., and is a male on the right side and a female on the left. In both specimens the frenulum is single on the male side, but divided on the female.

As the sexes of this moth differ so strongly in the form and colour of the wings, and in the pectinations of the antennæ, an Hermaphrodite is a remarkable insect to look at, and seems almost to suggest that it is a work of art.

Hermaphroditism in this species is occasionally met with in Europe, several cases being on record in the European journals.

A CLASSIFICATION OF THE NORTH AMERICAN SPIDERS.

BY NATHAN BANKS, WASHINGTON, D. C.

The author has frequently been asked why he did not make a key for the families of spiders. He has answered that a correct key was impossible. But as such questions are getting more numerous, and connected with a desire to know something about spiders, the author has decided to put together what he could as a contribution to the classification of our spiders, principally for the use of those who are unable to obtain the costly works necessary for study.

I shall consider the family the highest group separated by definite characters; not but what certain families possess transition forms, but that the groups higher than the families are not defined by definite characters, but by tendencies. Two groups above the families I shall recognize, the higher the division, the lower the section; the section embracing certain families, the division one or more sections. To these I shall not attempt to make a key, but only designate their general characters and the families which they embrace. In the key for the families I shall be arbitrary; but in the system which follows I shall try to indicate the natural affinities.

The classification of spiders is difficult because of the few characters that can be used. This is not often understood by those who study nsects. Let the entomologist cut off from his insect the wings, the antennæ, one pair of palpi, unite the abdominal segments, obliterate all sutures, and how many characters will he have left! Yet even then he will have far more than the student of spiders can find in his subject.

A few words in explanation of the characters used in the key. The body of a spider is very definitely divided into two parts—the anterior, the cephalothorax; the posterior, the abdomen. Upon the anterior part of the cephalothorax are the eyes; the region they occupy is called the eye region. The eyes are arranged in transverse rows; abbreviations referring to them are frequently used, as S. E. side eyes; A. E. anterior eyes; P. E. posterior eyes; M. E. middle eyes; from these are made compounds, A. S. E. anterior side eyes, etc. Dark coloured eyes are diurnal, light coloured eyes are nocturnal. The region between the anterior row of eyes and the anterior or clypeal margin of the cephalothorax is called the clypeus or fillet. A groove on the meson toward the posterior part of the cephalothorax is called the median groove. There are more or less distinct furrows extending from the groove to the sides,

these are the radial furrows; the region of the cephalothorax between the anterior pair and embracing the eye region is called the head or pars cephalica. The mandibles are the anterior pair of mouth-parts; they are two-jointed, the second joint being called the fang, and furnished with the opening of the poison gland. The maxillæ form the second pair of mouth-parts; to the sides of the maxillæ are attached the palpi, which in the adult male have the terminal joint peculiarly modified for sexual purposes. Between the maxillæ and articulated to the sternum is the lip. The sternum is the ventral plate of the cephalothorax, the entire region between the base of the legs. The legs, of four pairs, are numbered from before backward, I., II., etc. The legs are seven-jointed; the joints are called, beginning at the most basal, coxa, trochanter, femur, patella, tibia, metatarsus, and tarsus; in a few peculiar groups there is an eight joint, the onychium. At the end of the tarsus, or onychium if present, are two claws, equal in size; below and between them is frequently a third, smaller and more curved. The claws may be furnished with teeth, and are called dentated. Sometimes under the two larger claws, in place of a third, is a dense brush of hairs called a scopula. The abdomen is joined to the cephalothorax by a slender pedicel. At, or near, its extremity on the under side or venter are the spinning organs called spinnerets; these are of three pairs, the middle pair smaller and concealed by the other two. The spinnerets are probably always two-jointed, but in some spiders one pair is very prominently so. At the base of the lower pair of spinnerets is sometimes a transverse surface provided with spinning tubes; this is called the cribellum. Complementary to this in function is a row of stiff hairs or bristles on the posterior metatarsi called the calamistrum. Near the base of the spinnerets is a pair of stigmata, which are sometimes placed much more anteriorly, even nearer the basal than the distal end of the abdomen. When so situated there is formed a transverse ridge or fold on the venter. Near the base of the venter is a pair of transverse slits; these are the lung-slits. In some spiders there are two pairs. Between them on the median line is the opening of the genital organs; in the female called the epigynum. Its structure, together with the structure of the male palpal organ, is of utmost importance in the determination of species.

Because of certain peculiarities, I shall treat the cave forms separately in the key. The characters of the families as indicated in the system should be used in connection with the key.

KEY TO THE FAMILIES OF SPIDERS OF THE U. S.

1 { Fang moving vertically, usually two pairs of lung slits 31
  { Fang moving horizontally, but one pair of lung slits 2

2 { Cave species 3
  { Not cave species 5

3 { Six eyes, in three groups of two each, body round ..... *Dysderidæ*
  { Eyes not so arranged, body more elongate 4

4 { Two claws to tarsi ..... *Clubionidæ*
  { Three claws to tarsi ..... *Theridiidæ*

5 { Eyes six 6
  { Eyes eight 9

6 { A pair of stigmata just caudad of the lung slits ..... *Dysderidæ*
  { No stigmata close to lung slits 7

7 { The six eyes in three groups of two each ..... *Scytodidæ*
  { The six eyes in two groups of three each 8

8 { Legs very long and slender ..... *(Spermophora) Pholcidæ*
  { Legs short ..... *(Neophanes) Dictynidæ*

9 { Cephalothorax produced in front of pars cephalica, which is very small, maxillæ closely surrounding the lip, mandibles small, cephalothorax roundish 10
  { Not such spiders 12

10 { S. E. touching ..... *Pholcidæ*
   { S. E. separated, P. S. E. and P. M. E. touching 11

11 { Apex of abdomen surrounded by a circle of bent hairs ..... *Urocteidæ*
   { Abdomen without such hairs ..... *Filistatidæ*

12 { Eyes equal or subequal, often dissimilar *, more or less in two rows variously curved, forming a group much wider than long 20
   { Eyes unequal, similar, in three or four rows, forming a group almost as long or longer than wide 13

13 { With a calamistrum and cribellum ..... *(Hyptiotes) Uloboridæ*
   { Without calamistrum or cribellum 14

14 { Largest eyes in anterior row 15
   { Largest eyes not in anterior row 16

15 { Eyes in three rows ..... *Attidæ*
   { Eyes in four rows ..... *Lyssomanidæ*

16 { Two claws to tarsi, only two eyes in anterior row ..... *Ctenidæ*
   { Three claws to tarsi 17

* Dissimilar = eyes of two colours, dark and light; similar = eyes of but one colour.

17 { Two eyes in anterior row.....18
Four eyes in anterior row.....19

18 { A high clypeus.....*Oxyopidæ*
Almost no clypeus.....*Podophthalmidæ*

19 { Eyes of second row immensely larger than those of the third row.....*Dinopidæ*
Eyes of second row not much larger than those of third row. *Lycosidæ*

20 { With calamistrum and cribellum, three claws to tarsi.....21
Without calamistrum and cribellum 22

21 { S. E. not as far apart as M. E., clypeus high .....*Dictynidæ*
S. E. as far or farther apart than M. E., clypeus low ..... *Uloboridæ*

22 { Tarsi with two claws.....23
Tarsi with three claws.....27

23 { Second pair of legs longer than the fourth, all eyes similar, cephalothorax somewhat roundish.....24
Second pair of legs not longer than the fourth, A. M. E. diurnal, rest nocturnal, cephalothorax more elongate..... 25

24 { A. M. E. very close to clypeal margin, clypeus low .....*Sparassidæ*
A. M. E. some distance from margin, clypeus higher..... *Thomisidæ*

25 { Mandibles very large, trochanters long.....*Prodidomidæ*
Mandibles and trochanters normal.....26

26 { Maxillæ with a concavity or furrow.....*Drassidæ*
Maxillæ convex.....*Clubionidæ*

27 { But one pair of spinnerets.....*Palpimanidæ*
Three pairs of spinnerets.....28

28 { Clypeus wider than ocular area.....29
Clypeus narrower than ocular area.....30

29 { Lower spinnerets longer than upper, two-jointed.....*Enyoidæ*
All spinnerets equally short.....*Theridiidæ*

30 { Superior pair of spinnerets longer than the others, two-jointed, A. M. E. diurnal, S. E. separated, not far from M. E.. .....*Agalenidæ*
All spinnerets short, S. E. often touching, often far from M. E. .....*Epeiridæ*

31 { Legs very long and slender.....*Hypochilidæ*
Legs stout and shorter.....32

32 { Two pairs of lung slits.....33
But one pair of lung slits..... *Catadysidæ*

33 { Palpi arising from the side of maxillæ.....*Atypidæ*
Palpi arising from the tip of the maxillæ.....*Theraphosidæ*

A SYSTEM OF SPIDERS.

Division I.—*Gnaphosæ.*

This embraces but one section.

Section I.—This section contains the spiders which have the mandibles moving vertically. With the exception of one doubtful form they have four lung sacs. There is no epigynum in these forms, the male palpal organ is very simple, consisting of a bulb tapering on one side to a tube; the tarsus of the palpus is not at all modified. They are a tropical group and include the largest and most powerful spiders known. They have developed from primitive spiders like *Filistata.*

Family 1, *Atypidæ.*

This includes but one genus, *Atypus*, whose members are quite rare.

Family 2, *Theraphosidæ.*

These are the tarantulas. We have two sub-families.

1 { Inner distal angle of maxillæ slightly prolonged; palpi somewhat lateral..... *Eriodontinæ.*
{ Inner distal angle of maxillæ not prolonged; palpi terminal. ..... *Theraphosinæ.*

The *Theraphosinæ* may be divided into two tribes.

{ Three claws to tarsi..... *Trionchi*
{ Two claws to tarsi ..... *Dionchi*

The *Dionchi* have one genus *Eurypelma;* the true tarantulas. The *Trionchi* may be separated into two groups.

{ Median groove longitudinal..... *Mecicobothri*
{ Median groove transverse ..... *Epicephali*

Family 3, *Hypochilidæ.*

This is represented by one peculiar genus *Hypochilus.* In the shape of the body and the length of the legs it has great resemblance to a *Pholcus.* It has a calamistrum and cribellum. The only species in the U. S. spins a web similar to some *Theridiidæ.*

Family 4, *Catadysidæ.*

Represented by one genus *Catadysas*, which has not been seen since described by Hentz. It stands on the dividing line between the typical members of this division and the more typical spiders, in having but two lung-sacs.

Division II.—*Micrognathæ.*

With but one section.

Section II.—This includes spiders of the most primitive and comprehensive form; "prophetic types" as the older naturalists would call them. They have a roundish cephalothorax which projects in front of the small pars cephalica. The maxillæ closely surround the lip. The mandibles are small. The legs are usually long and slender, and they make irregular webs.

Family 5, *Filistatidæ.*

These are the lowest spiders. The pars cephalica is no larger than the eye-tubercle of *Phalangida* with which it is homologous. The male palpal organ is the most simple, only a tube at the end of the tarsus. *Filistata* occurs in the southern parts of our country.

Family 6, *Urocteidæ.*

This family is represented by one species of *Thalamia* in the Southern States.

Family 7, *Scytodidæ.*

This distinct group is represented by two genera, somewhat rare in the Southern States.

Family 8, *Pholcidæ.*

Here the legs are long and slender, the tarsus in the typical forms being furnished with an eighth joint. The forms are principally southern. I include in this family *Pholcus*, *Spermophora* and *Spintharus.*

Division III.—*Veræ.*

Here we come to the typical and more common spiders. It embraces three sections.

Section III.—This is about the same as the *Tubitelariæ* of certain writers. The cephalothorax is usually low and elongate. The abdomen also is commonly elongate and low. The legs fitted for running. The eyes are equal in size and plainly in two rows.

Family 9, *Dysderidæ.*

These have but six eyes; just behind the lung-slits is a pair of stigmata. The forms are uncommon.

Family 10, *Prodidomidæ.*

We have but one genus and species in the Southern States.

Family 11, *Drassidæ.*

This embraces a number of common spiders. The body is low and flat, the legs short and stout, the spinnerets usually projecting behind. They spin no web but lead a wandering life in search of prey, mostly at night. There are two sub-families.

{ A dorsal groove present ..... *Drassinæ.*
{ No dorsal groove present ..... *Micarinæ.*

The latter group is represented by *Micaria* which is quite rare.

The *Drassinæ* may be divided into two tribes.

{ Hind row of eyes recurved ..... *Gnaphosi.*
{ Hind row of eyes straight or procurved ..... *Drassi.*

The former includes *Gnaphosa*, *Poecilochroa* and *Pythonissa*. The latter includes *Echemus*, *Drassus*, *Prosthesima* and *Teminius*.

Family 12, *Clubionidæ.*

Closely related to the preceding family, they are usually light coloured, while the *Drassidæ* are dark.

The legs are a little longer and more slender, the spinnerets less prominent, and the abdomen more round. It may be divided into three sub-families.

1 { A transverse furrow on the venter ..... *Anyphæninæ*
{ No transverse furrow on the venter 2

2 { A stiff, horny shield either on dorsum or around the base of the pedicel ..... *Corinninæ*
{ Abdomen wholly soft ..... *Clubioninæ*

The latter sub-family may be divided into two tribes.

{ Two rows of very strong spines under tibiæ I. and II. ... *Phrurolithi*
{ Tibiæ I. and II. not strongly armed ..... *Clubioni*

Family 13, *Agalenidæ.*

Not a very extensive family; most numerous in the west. The pars cephalica here is very distinct, and occupies the whole width of the cephalothorax in front. One genus, *Cybaeus*, disagrees with the characters of the family, as the spinnerets are all short; the genus will, however, be readily recognized as belonging to the family because of its general resemblance to other more common forms. Two well marked sub-families can be recognized.

{ A transverse furrow on venter, lower spinnerets widely separated ..... *Hahninæ*
{ No ventral furrow, spinnerets as usual ..... *Agalenin*æ

The latter may be divided into two tribes.

{ Upper spinnerets long, two-jointed ..... *Agaleni*
{ All spinnerets short ..... *Cybaeni*

Family 14, *Enyoidæ.*

The lower spinnerets here are long and two-jointed. Otherwise much like the preceding family. We have one genus, *Habronestes*, in the Southern States.

Family 15, *Palpimanidæ.*

Peculiar in having but one pair of spinnerets. One genus, *Lutica* from Utah.

Family 16, *Dictynidæ.*

This family is much like *Agalenidæ*, but have the accessory spinning organs. They are usually smaller. They spin small irregular webs, hanging from the under side.

Section IV.—This includes a large number of common spiders. They spin webs to catch prey. Most of the forms are very much alike in appearance. The abdomen short and rounded, the cephalothorax short with well developed pars cephalica, and the legs somewhat long, always with three claws. The spinnerets are short, the male and female organs well developed.

Family 17, *Theridiidæ.*

This is the largest family of spiders, and many of its members are very small. They spin irregular webs, and hang inverted from the under side. The males frequently possess peculiar sexual modifications of the head. They can be arranged in three sub-families whose limits are not distinct. Their general characters are as follows :—

Theridinæ.

The abdomen is large and roundish, the cephalothorax short, the legs long and quite slender; mandibles thinner than femur I.; male palpal organ without tarsal hook.

Erigoninæ.

These are smaller species, the abdomen not very much larger than the cephalothorax, and a little elongated. The legs are shorter than in the *Theridinæ*, and the male palpal organ has a tarsal hook; the epigynum not projecting, the legs without long spines, head of male often curiously modified.

Lingphinæ.

These have longer legs than the preceding, and they are more spiny; the epigynum often projects. They are more usually marked than the *Erigoninæ*, and are generally larger.

Family 18, *Epeiridæ.*

This includes the common orb-weaving spiders; a few other genera are included—*Pachygnatha*, *Glenognatha*, *Bellinda* and *Mimetus*. They are very similar to the *Theridinæ*, but have a low clypeus. Three sub-families may be recognized.

1 { Body with spine-like projections..... *Gasteracanthinæ*
  { Body without such projections, at most with two basal humps..... 2

2 { Male mandibles large, body elongate..... *Tetragnathinæ*
  { Mandibles small, body shorter..... *Epeirinæ*

These sub-families, like those of the *Theridiidæ*, also intergrade.

Family 19, *Uloboridæ.*

Related to the *Epeiridæ* by their habit of building orb-webs, but their structure quite distinct. We have but two genera, *Uloborus* and *Hyptiotes*.

Section V.—This includes the Laterigradæ of authors. The body is flattened, the first two pairs of legs long, the abdomen short and roundish.

Family 20, *Thomisidæ.*

These are frequently found upon flowers and fences waiting the approach of some insect. There are a great number of cases of protective resemblance in the group. They walk most easily sideways, and many throw off their legs very readily.

{ Two front pairs of legs much larger and longer than the others, no scopula..... *Thomisinæ*
{ Two front pairs of legs not larger than the others, a scopula present..... *Philodrominæ*

Family 21, *Sparassidæ.*

These resemble the *Philodrominæ* of the preceding family. They occur in the south and southwestern parts of the U. S.

Division IV.—*Oculatæ*.

Here the eyes are strongly unequal in size; the pars cephalica very large, the eyes in three or four rows. They are the most active and highly developed spiders. They spin no web but hunt their prey.

Section VI.—This includes the *Citigradæ* of most authors.

Family 22, *Ctenidæ*.

These have much affinity with the *Sparassidæ*. There is but one genus in the Southern States.

Family 23, *Lycosidæ*.

These are the "wolf-spiders" which run among leaves and grass and over rocks. Their legs are moderately long and quite stout, with many hairs and spines. The mandibles are large and strong.

{ Ocular area slightly broader than high ..... *Dolomedinæ*
{ Ocular area as high or higher than broad ..... *Lycosinæ*

Family 24, *Dinopidæ*.

One genus quite peculiar in the South.

Family 25, *Podophthalmidæ*.

One peculiar genus in the Southern States.

Family 26, *Oxyopidæ*.

Three genera, mostly southern and western forms. Somewhat intermediate between the *Lycosidæ* and the *Attidæ*.

Section VII.—The *Saltigradæ* of authors, the "jumping-spiders". Their body compact, the legs short and stout, the size medium. The *Hymenoptera* of spiders.

Family 27, *Attidæ*.

This contains nearly all the forms of the section. Three sub-families may be recognized.

1 { Ant-like spiders, slender legs ..... *Synemosinæ*
{ Not ant-like, legs more stout 2

2 { Eye region longer than thoracic region ..... *Ballinæ*
{ Eye region shorter than thoracic region ..... *Attinæ*

The latter may be separated in two tribes.

{ Cephalothorax low, depressed ..... *Marptusi*
{ Cephalothorax high, raised ..... *Phidippi*

Family 28, *Lyssomanidæ*.

One genus in the Southern States.

CANADIAN HYMENOPTERA.—No. 1.

BY W. HAGUE HARRINGTON, OTTAWA.

Under this heading, I propose to give from time to time descriptions of new species in my collection, and such notes on other species as may seem of value to students of our fauna.

NOTOPYGUS AMERICANA, n. sp. — Female, length 10 mm.; head, antennæ, thorax, coxæ and first segment of abdomen, black; remainder of abdomen and legs red; antennæ as long as head and thorax, filiform, joints short and subequal; thorax elongate, shining; metathorax, rounded and obliquely truncate; wings, slightly infumated, with black nervures; abdomen shining, as long as thorax, triangularly clavate, truncate at apex, with the ovipositor curved upward; sheaths black.

Described from one ♀ captured on 16th June, 1891. This fine species is the first of the genus to be recorded from Canada, and may be readily recognized by the conspicuous, erect ovipositor.

PRIONOPODA CANADENSIS, n. sp.—Female, length 9 mm.; head above antennæ, thorax, coxæ and trochanters, posterior tibiæ and tarsi, base and apex of abdomen, black; face below antennæ, the cheeks, anterior and middle legs, posterior femora and base of tibiæ, abdominal segments two, three and base of four, and venter, red; head very large, wider than the thorax, cheeks much swollen; antennæ very long, brownish above, pale beneath; third joint globose, smaller than second, fourth nearly as long as five and six; thorax short and robust; metathorax rounded; scutellum rather prominent, rounded; wing without areolet; posterior legs long, femora slightly clavate, coxæ large, globose; claws strongly pectinate; abdomen fusiform, somewhat compressed at apex.

Described from one ♀ captured on 20th June, 1891. This is a very handsome species, owing to its coloration and highly polished appearance (no punctures are visible under a strong hand lens). It should perhaps form the type of a new genus, as it differs greatly in structure of thorax, etc., and in wing venation from *P. scutellata*, Ashm.

ISCHYROCNEMIS OTTAWAENSIS, n. sp.—Female, length 7 mm.; black with the legs, scutellum, mouth parts and orbits of eyes honey-yellow; head slightly swollen so that the face is feebly carinate; antennæ long, pubescent, with longer erect hairs at apices of joints; thorax shining;

metathorax rounded, faintly areolated; scutellum elevated, smooth, red on the disc; legs not very stout, posterior femora but slightly swollen; wings large, hyaline, stigma pale-yellow, areolet rhomboidal; abdomen polished; apex of segments one and two narrowly margined with red; ovipositor exserted, red, sheaths black.

Described from one ♀ captured some years ago, and differs abundantly from *I. carolina*, Ashm.

MESOLEPTUS NIGRICORNIS, Prov. (Add. Faun. Hym. 99), must be removed to the genus *Ctenopelma*. The type which is in my collection has the claws so distinctly pectinate that I do not see how this character was overlooked. I have a second ♀ taken shortly after the first one was described.

PIMPLA ELLOPIÆ, n. sp.—Female, length 10 mm.; black with red abdomen; face coarsely punctured, with feeble smooth ridge below antennæ, which are long and slender; thorax shining, punctures shallow; legs black, anterior femora and tibiæ with pale line, anterior and middle tarsi rufous, base of posterior tibiæ and the tarsi piceous; abdomen red shining; punctures fine; ovipositor half as long as abdomen.

Male, length 8 mm.; posterior femora red, and abdomen slightly darker and not so polished as in the ♀.

Described from one ♀ and one ♂ received from Mr. Fletcher, who bred them from pupæ of *Ellopia somniaria* from Victoria, B. C. (See report of Experimental Farms, 1890, page 177.)

OUR WINTER BEETLES.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Though the winters of Iowa are quite severe, there are, nevertheless, always a few days when the weather is moderate enough to admit of the entomologist getting out for a few hours work at his favourite pursuit. When the sun comes out and the snow disappears in sheltered spots, a little investigation will yield much that is of interest, and throw considerable light on the habits of many of our insects.

Among the Carabidæ to be found in February may be mentioned

[illegible] all except the first [illegible] the *Pleuratus* and *Platypus* perching near [illegible] the others [illegible] *Dysderoides* [illegible] *Leucopteius fasciatus*; I have seen it [illegible] What explanation can be advanced to account for their remaining active [illegible]

Segestrina florisuga and *insulsa* may be taken under stones and chips [illegible] *Dysderina ferrea* and one or two other Segestrinæ. *Segestrinæ* are the most numerous of all, both in species and individuals, and all of the following species may be taken at any time during the winter:—*Pedetes* sp. *Textrix insulana*. *T. segmentata*. *Eriagrus armatus*. *Leucopteius ornatus*. *Silitica angularis*. *Dictyna arundinacea*. *Hyptiotes cavatus* and two or three species of *Theridion*, all under stones or chips, some being found also in moss. *Segestrina pantropicana* I also find in moss during cold weather, and it has been met with at any other time. The finest specimens are to be rarely taken [illegible]

At Pietermaritzburg I always find numerous *Textrix* webs, and I [illegible] at Durban [illegible] *Textrix* [illegible] and at Inanda [illegible] webs [illegible] and [illegible] a [illegible] with *Textrix* [illegible] The remaining families [illegible] represented [illegible] I [illegible] the great number of species that [illegible] them [illegible]

[illegible] have been taken [illegible] under stones, as I was [illegible] the [illegible] [illegible] [illegible]

Many species no doubt pass the winter in the perfect state, but being either buried deep in the ground or imbedded in the substance of trees escape our notice, and as few entomologists are sufficiently enthusiastic to make large and deep excavations with so little prospect of return I fear our knowledge of such as are included in the former category will long remain incomplete. My own exertions at the wood pile have yielded only bark beetles (and larvæ) during the winter, though some evidently spend this season more or less deeply imbedded in sound or decaying wood. (See note by Mr. Blanchard, CAN. ENT. VII., p. 97.)

Any comparison of such an incomplete list of our winter insects with the forms known from the inhospitable climate of the far north would be vain; but I would remark the preponderance of Staphylinidæ, as suggestive, when taken in conjunction with the nature of the species of the other families here noted, of at least an apparent similarity.

CHIONOBAS UHLERI.

BY T. D. A. COCKERELL, INSTITUTE OF JAMAICA.

Mr. W. H. Edwards, in his most interesting account of *Chionobas uhleri*, (Butt. N. A., Pl. XII., Vol. 3) remarks that he can find no evidence that it is found in the south of Colorado. It may, therefore, be as well to record that I found it near Swift Creek, in Custer County; and Mr. H. W. Nash informed me that it occurred at Rosita, in the same county. These localities are just north of 38° N. Lat.

With regard to the variation in the ocelli of this and other Satyridæ, it becomes rather difficult to give statistics without the use of some regular formula. Mr. Edwards gives the *number* of ocelli observed in different individuals, but we are left in doubt as to *which* particular ones were present, and which absent.

A convenient method of indicating the exact nature of these variations is to have a series of figures corresponding to the interspaces, numbering from above downwards. If a butterfly had fully developed pupilled ocelli in all the interspaces, the formula would read P. (for primary) 1234567, S. (for secondary) 1234567. When an ocellus was wanting, o might be

substituted, and for an ocellus which had no pupil, we might put a small figure below the line, thus $_{2}$. Two or more ocelli joined would be bracketed together, so (12), and a continuous band would consequently be represented by all bracketed together, thus (1234567). Up. s. and und. s. might be used to indicate the upper and under sides respectively; and in the case of asymmetrical specimens (which are rather frequent in some species) the left and right sides would require sparate formulæ.

To give examples, the figures of *C. uhleri* on Mr. Edwards's plate would have the following formulæ:—

Fig. 1, up. s. P. $00_{3}0000$ S. 0000000.
Fig. 2, und. s. P. $00_{3}0000$ S. 0000000.
Fig. 3, up. s. P. $0_{2}34_{56}0$ S. 0234560.
Fig. 4, und. s. P. 0034560 S. 0234560.
Fig. 5, up. s. P. $00_{3}0_{56}0$ S. $00_{3}0_{56}0$.
Fig. 6, up. s. P. $00340_{6}0$ S. $0_{23}00_{6}0$.

This looks complicated, but the method is really simple and easy to understand, and as short as any which exactly defines the character of the variation.

HOW TO TAKE THE OIL OR GREASE OUT OF SPECIMENS OF NATURAL HISTORY.

BY PH. FISHER.

When a specimen has become oily (Lepidoptera, Coleoptera, Orthoptera, etc.,) use a bottle with a neck wide enough to let the specimen slip through easily, pin and all. Put in this bottle enough common naphtha to fully cover the insect, and introduce it into the fluid. Leave it in the bottle from 10–12 hours. Then take it out, and lay it on some blotting paper, where it will soon dry. If not yet clean, introduce in fresh naphtha once more. This treatment will not injure the insects in the least; they will come out brand new. Before publishing this, I have tried it on the most delicate Lepidoptera and Coleoptera, with the best results. If the body only is oily, break it off gently, and treat in same way.

CORRESPONDENCE.

PROF. J. B. SMITH'S LIST OF LEPIDOPTERA.

Dear Sir: There be criticisms and criticisms; those intended as friendly and those intended as destructive in character, and sometimes one is as unwittingly unjust as the other may be intentionally so. Mr. Dyar's notice of the List of Lepidoptera, in the February number of the CAN. ENT., calls forth this moralizing expression. Mr. Dyar is evidently a friendly critic, and I feel obliged for his kind words; but some of the "inaccuracies and omissions" are misleading. The List went to the printer in June, the Bombycids were printed in August, and Mr. Hudson's descriptions of *Dasychira* and *Cerura* did not appear until September or October.

Sarrothripa reveyana, S. V., is not an omission. Speyer showed years ago that the American forms were distinct from the European, and he named the Americans *S. lintneriana*. I might have cited *reveyana* in error as a synonym of *lintneriana;* but can hardly be charged with an omission.

Gastropacha alescensis, Pack., is unknown to me, except in the casual reference by Stretch. It is not given in Dr. Packard's monograph of the *Bombycid* , nor does it appear in Mr. Grote's lists. I have not examined all of Dr. Packard's writings; but in the list of "The Entomological Writings of Dr. Alpheus Spring Packard," by Samuel Henshaw, Bulletin 16 of the Division of Entomology, U. S. Department of Agriculture, there is no mention of any *G. alescensis* in the "Systematic Index of the New Names Proposed." It is quite fair to assume that no such species was ever described, until Mr. Dyar points out the place of original description.

The compiler of a list cannot reasonably be held to a special knowledge of all groups, and if he gives the condition of affairs as it stands in literature at the time, he has made no error. As literature stood when I wrote, *Arctia sciurus* had been referred to *Euchætes collaris*, and I could not know that Mr. Edwards had reached a different conclusion—even now Mr. Dyar does not state positively that *sciurus* is *not* a variety of *collaris*. Unpublished synonymy does not form a good basis for a charge

of inaccuracy. As to *Edema albicosta*, Hbn., I find on my cards after the reference to the original description:—"1825, Treit. Schmett. Eur. V., 2, 167=*albifrons* with an erroneous locality." Packard omits the name altogether, while Mr. Grote lists it as distinct. As to *Cerura*, Mr. Dyar is entirely correct. I copied the species as given in his table; but unfortunately in preparing the MSS. for the printer I failed to number *scitiscripta*. The name was therefore put in italics and I failed to notice the error in reading proof. *Hemileuca neumoegeni* and *Eutheca mora* are genuine cases of omission.

I have replied to Mr. Dyar's criticisms because they were kindly and therefore very much more apt to convey weight; also to show that it is not safe to assume that criticisms are always well founded even when not replied to.

J. B. SMITH.

MANUAL OF THE MICROLEPIDOPTERA OF N. AMERICA.

Prof. C. H. Fernald, of Amherst, Mass., is at work on a manual of the Microlepidoptera of North America, a work for which his studies of the last twenty years have admirably fitted him. He has made two trips to Europe for the purpose of studying the types of our Micros in the European museums, and has studied all the prominent collections in this country. His magnificent library and collections of these moths afford him the best possible facilities for carrying out this work, which will prove a task which anyone else could hardly undertake. The immensity of this work is appalling when we consider the extent of territory embraced, the great number of species, and particularly the fact that we have so few good collectors of Micros in this country.

Prof. Fernald is particularly desirous that collectors should give especial attention to the collection of Microlepitoprera for the next few years.

OBITUARY.

It is with the deepest sorrow that we have to announce the death, on 15th March, of Mr. F. B. Caulfield, of Montreal, who has been for many years an active member of our Society. His loss will be keenly felt by the members of the Montreal branch, of which he has always been one of the chief supports. We tender our sincerest sympathy to his sorrowing family.

Mailed April 2nd.

The Canadian Entomologist.

VOL. XXIV. LONDON, MAY, 1892. No. 5.

MISCELLANEOUS NOTES ON BUTTERFLIES, LARVÆ, ETC.

BY W. H. EDWARDS, COALBURGH, WEST VA.

(Continued from page 56.)

2. *Argynnis Oweni*, n. sp.

MALE—Expands 2.25 inches.

Upper dull side red-fulvous, not much obscured by brown at base; the markings rather heavy, the two marginal lines on both wings more or less confluent. Under side of primaries either yellow-buff from base to the row of rounded spots, the nervules being red-brown, or the interspaces are very lightly washed with this colour over the buff ground; the subapical patch dark brown with a small imperfectly silvered spot; the five submarginal spots also are of same character; sometimes the silver is wholly wanting.

Secondaries dark brown and gray-buff, the brown prevailing on the disk, so that the second row of spots stand on a clear brown ground; but above this to base the buff prevails, especially along the third row of spots, and below the cell; but occasionally the mottled surface extends quite to the belt; the belt red-buff, and very narrow, being much encroached on by the dark brown (almost black-brown) projections from the discal area, and by the wide brown edging of the submarginal spots; these spots are small, semi-oval; those of the second row small, sub-oval; the outer row is generally well silvered, but all the others are imperfectly so in most cases, but occasionally one is well silvered throughout, or the outer two rows may be well and the remainder imperfectly silvered.

FEMALE.—Expands 2.4 inches.

The fulvous mottled with yellowish on both wings outside the mesial band, on secondaries the yellow corresponding with the second row of silver spots; also in the cell of primaries the hue is yellow fulvous; the black markings all very heavy; the marginal lines nearly confluent throughout. Secondaries as in the male, except that the basal colour is

deeper, reddish ; mottled as in the male ; in all the specimens under view the spots are well silvered.

From 87 males and 6 females taken by Professor Edward T. Owen on Mt. Shasta, elevation 7,500 feet. These specimens have all been viewed by me. The upper side of the female is very close to *A. Behrensii* in colour and in weight of the black markings. In the male of that species the markings are much lighter than in the present one. On the under side both sexes of *Behrensii* have the ground of hindwings solid ferruginous, not mottled as in *Oweni*.

2. *Argynnis Cornelia*, n. sp.

Male.—Expands 2.3 inches.

Upper side dark brown from base to the common mesial band, excluding the upper outer part of the cell of primaries, the space beyond the band light red-fulvous ; the black markings rather delicate ; the margins edged by two parallel fine lines. Under side of primaries cinnamon-brown (or sometimes a little reddish), from base to hind margin on inner half of the wing ; the interspaces towards apex yellowish ; the subapical patch red-brown, enclosing a small silver spot ; the hind margin red-brown, the five silver spots small.

Secondaries almost solid red-brown from base to the clear yellow-buff belt, broken only by a few short streaks of buff on the disk ; the spots all small, well silvered ; those of the marginal row subtriangular, edged heavily on the basal side by red-brown ; those of the second row mostly narrow sub-oval, very lightly edged at top with black, as are the spots of the third row ; two small spots next base, and one in the cell.

Female.—Expands 2.5 inches.

Less bright red, the markings heavier ; the submarginal spots on primaries pale yellowish fulvous ; the marginal lines on same wings confluent on upper half. Under side of primaries red over inner half ; secondaries as in the male, the ground less red, more brown ; all the spots well silvered.

This species flies with *Electa* and *Hesperis*, at Ouray and Manitou, Colorado, and in the adjacent districts, where it has been taken abundantly by Prof. Owen. Mr. Bruce has taken it also at Crested Butte in the Ouray region. It is of same size as *Electa*, and resembles *Cybele*, especially the form *Carpenterii*, much as *Electa* resembles *Atlantis*, the basal area contrasting strongly in hue with the area beyond, as in *Cybele*.

Described from nearly forty examples sent me by Prof. Owen and Mr. Bruce. At the request of the Professor I name this species in memory of his deceased daughter, Miss Cornelia, formerly the companion of his entomological excursions.

3. *Limenitis Weidemeyerii*, Edw.

Mr. Bruce sent me fifteen eggs of this species from Hall Valley, Colorado, elevation 10,000 feet, and I received them 24th August, 1891. He wrote:—" I saw the female evidently trying to lay her eggs; caught and tied her on a small cotton wood close to my window. It rained for three days, and during this time she remained motionless on the under side of a leaf. By noon on the fourth day the weather had become fine and warm. On the fifth day she laid the eggs. I have before confined several females of the species without effect, and was not a little pleased at seeing the beautiful eggs." (I may say here that *L. Ursula* is almost the only species of butterfly which has persistently refused to lay eggs for me in confinement. *L. Disippus* will lay readily enough, but I never have seen more than two or three eggs of *Ursula.)* The eggs of *Weidemeyerii* are of same character as those of the allied species at the east, and the young larva at birth looks just like a young *Disippus* larva—the colour light brown. It makes a perch in exactly the same way. After the first moult, the colour was dark gray-black, the patch on middle segments sordid white, and the stripe at base along the last segments same; so was the dorsum on 3 and 4. The description of *Disippus* at this stage will cover the present species, except that the latter is more gray. After second moult the colour was mostly black, the patch and stripe yellow-white. The third moult I missed. After the fourth, length .8 inch, the shape and the processes were closely as in *Disippus;* the dark parts red-brown, a little mottled black; the patch yellow-buff; the basal stripe pure white, and running from 2 to 13; the dorsum and sides of 3 and 4 yellow-buff; the processes as in *Disippus;* length of the process on 3 .11 inch; head as in *Disippus*, red-brown, rough with tuberculations. Three days after fourth moult the dark parts turned to olive-green (just as in all the allied species). At maturity, measured 1.2 inch, lying straight on a stem. After four days more suspended, and the next day pupated. The pupa measured .9 inch in length, shape of *Disippus* and *Ursula*, the dorsal process possibly a little more circular than in *Disippus;* colour of the head case, and of ventral

side, and of the wing cases, blackish-brown, as is also the process; abdomen light-buff with a pink tint, mottled with olive-green, less so on the dorsal side; the end segments dark-brown; dorsal side of head-case and the mesonotum pale brown, the head-case obscurely silvered. I got but one pupa, and that died before imago, and of this Mrs. Peart made a coloured drawing. Only one larva went through all the stages, the others, after second moult, made cases, just as the allied species do, and I have them here, out in the weather, under a net to protect them from birds. The larvæ hatched 28th August; passed first moult 1st September, second moult 4th; one passes fourth moult 13th Sept., pupates 18th.*

4. *Argynnis Epithore*, Boisd.

This small species belongs to Group II. of my Catalogue, 1884, and its nearest ally on this continent is *A. Bellona*, Fabr. It flies in the Pacific States and to and through the Rockies. On 7th July, 1890, I received several eggs from Mr. Kœbele at Spokane, Washn., and they were hatching on arrival. The larvæ passed first moult on 11th July; second, 15th; third on 19th, and within two days thereafter all except one became lethargic after third moult, and before 27th July. The one passed its fourth 7th August, and was sent to Professor Riley for a drawing. It pupated while in his care, but I have not the date. The imago came out at Washington. Excellent coloured drawings were made of the adult larva and pupa. I attempted to carry the hibernating larvæ through the winter at Coalburgh, but they one by one died, the last about middle of February. The food plant was violet. The larva at birth resembled closely those of *Bellona* and *Freya* (which last I had feeding at same time), the segments 5, 7, 9, 11 being brown, as in those species, while the rest of the body was pale green. After first moult, length .14 inch; colour greenish-brown over upper part, greenish beneath; the spines short, stout, tapering, black; those on 2 no longer than in following segments.

At second moult, .24 inch; colour of dorsum black, with a pair of mid-dorsal gray lines; the sides mottled dull white and green; along base a narrow sordid white stripe from end to end; all the spines black, but in the dorsal rows, at bases of 2, 6, 8, 10, on outside, tubercle is pale, obscurely whitish.

* I am able to say, on revising these proofs, that I got two of the larvæ through the winter. One has passed two moults since waking up, the other still sleeps.

After third moult: length .3 inch; colour gray, the sides speckled white; a blackish mid-dorsal stripe; the outer side of the tubercles of the mid-lateral row now white, and this colour is diffused so as to give the appearance of a macular stripe the whole length of body.

After fourth moult: length .5 inch; general colour gray; the dorsum and lower part of side dark; the area between these dark portions streaked crosswise with black; the basal stripe red-brown; the spines mostly russet from tip to base, but those on 2, 3, and the lower ones on 13, are all black; those on dorsum of 4 and 13 tipped black; all spines short, slender, tapering, with short black hairs; head obovoid, shining black, with long black hairs. I can only describe the pupa from the drawing. Shape of *Bellona;* the ventral side and the wing cases pale brown, the latter, along the margins shading into whitish, and at the margin becoming pure white; head-case on the dorsal side, and the meso-notum, pale brown mottled with whitish, in the excavation quite dark brown, especially next the wings; abdomen whitish, finely mottled with pale brown, with a dark brown patch on either side the ventral line on 9, 10, 11.

This larva, in the later stages, is quite different in coloration from *Bellona*, as may be seen by comparing this description with Mr. Scudder's, of *Bellona;* and the pupa differs still more.

5. *Anthocharis Genutia* and *A. Ausonides.*

On page 52 of this volume, I said that I had one pupa of *Genutia* of 1890 living. I had, in fact, three pupæ of that age, but supposed two were dead. But March 9th 1 ♂, and on 13th 2 ♀s came out, beautifully marked, all of them, the orange of the male vivid, and all with unusually large, black edging to forewings, and black marks at tips of the nervules of the hindwing.

At same time a female *Ausonides* has come out of a pupa that I have had since May, 1890, a large, well-marked example, the hindwing very strongly buff colour. I am told that some collectors think that A. *Hyantis* is spring form of *Ausonides.* If so, it is a mistake. There is but one annual brood of *Ausonides.* In different years I have had four examples come from bred pupæ; all in the month of March; all typical *Ausonides.*

6. *Lycæna Lygdamas*, Doubleday.

On May 25, 1891, I received from Mr. A. D. Hopkins, the Entomologist of the Agricultural Station of West Virginia, four larvæ of this

species, found on *Vicia Carolinensis*. Mr. Hopkins wrote:—"The larvæ, when young, feed on the tender leaves and the flower buds; as they grow older they feed on the leaves and stems, eating the stems square off." The adult larva is very like that of *Pseudargiolus* in shape and appearance; length at rest .34 inch; breadth .05 inch; height .05 inch; long oval, the ends equally rounded; the dorsum high, a little flattened at top and sloping either way from about the middle; the last segment flattened; segment 2 is bent forward as in *Pseudargiolus*, and entirely conceals the head when at rest; it is depressed in the middle and thickened and cushion-like about the outer edge; colour pale green, the sides of the ridges marked by short, whitish, oblique bars, each bar crossing two segments; along the base a whitish stripe; on mid-dorsum of 11 is a cross slit, but I saw no fluid issue from it; on 12 the two cylindrical tubes and their tentacles were persistently thrust out and expanded. I got none of these larvæ to pupæ owing to a failure of food.

7. *Neophasia Menapia*, Felder.

Mr. Wright, in August, 1891, sent me eggs of this species obtained by him in vicinity of Mt. Shasta. They were laid 28th August, and I supposed would hatch immediately after arrival. But they have lived through the winter, and now, 15th March, look as fresh as when received. I was unaware that any species of Pierid hibernated in the egg stage. On 24th March, the day being warm, I brought the eggs into the house. On 4th April each egg had changed to white, and the black head of the young larva was visible through the shell. I thought they would soon hatch, but the larvæ died in the eggs. There must be two broods of the imago, and probably the eggs of the first one hatch a few days after laying.

8. *Colias Philodice*, albino male.

Since the issue of the March No. of C. ENT, I have received a letter from Mr. George A. Ehrman, of Pittsburgh, Pa., calling my attention to his report of the capture of an albino male of this species in Ent. News., Vol. 1, pp. 93 and 130. Since two males have been taken, it is to be inferred that others must exist in the proper season. Taking it for granted that all the white examples were female, I never searched for males, and so it has been probably with other collectors.

9. *Colias Christina*.

The first examples known of this species were described by me in 1863, and came from Great Slave Lake—3 ♂, 1 ♀—the males deep orange, the female yellow.

In 1872, I described Colias *Astræa* from a male taken by the Hayden Expedition in Montana. The upper surface was of a delicate buff. In 1883, Mr. Wm. M. Courtis, M. E., at Judith Mtn., Montana, took four males of the typical form; and, in 1890, Mr. W. G. Wright, at same place, took both *Astræa* and orange *Christina* in both sexes.

In CAN. ENT., XV., p. 221, 1883, Captain Gamble Geddes gave a list of butterflies taken by him, and among these was *Astræa*, and also *Christina*, both from Red Deer River. I saw these examples, and they embraced not only typical individuals but others of varying shades of colour, connecting the two supposed species; and with these lemon-yellow examples that seemed to belong to the same species with the others.

Within the last two years, Mr. Burrison and Prof. Owen have collected at Banff, and found all these forms—the orange, the buff and the yellow, with intermediate grades in great variety. Mr. Bean, at Laggan, has not only taken numbers of the same forms, but has carefully bred from the egg, and established the unity of the species *Christina* with *Astræa*, and the yellow form; and in due time we may look for a full account of his observations. From a small lot of larvæ of *Christina* just out of hibernation, sent by Mr. Bean, and received 28th May, 1891, I got four pupæ. On 19th June, emerged a green-yellow male; on 21st, another male, same form; on 22nd a green-yellow female; on 24th a yellow female with orange on the disks of the forewings. At the fourth (and last) moult the larva was .8 inch long; colour dark yellow green; along base a white stripe, within which, a few hours after the moult, a yellow stain began to show itself; no subdorsal white stripe; the under side light yellow-green; whole upper surface thickly covered with fine tubercles and short hairs of light colour; head yellow-green. At maturity the length was 1.4 inch; the yellow had become red in the band, but it was not in a continuous line as in many species of Colias, there being only a short red dash behind each spiracle.

The pupa was similar in shape and appearance to that of *Philodice*. Length, .78 to .8 inch; breadth, both across mesonotum and abdomen, .2 inch; the greatest depth, .24 inch; colour yellow-green, the ventral side of abdomen less green, more yellow; a broad yellow stripe from 13 to wing cases on mid-side, and continued, but in diminished breadth along the dorsal edge of wing to end of the beak; on the side of the abdomen below the yellow stripe a narrow stripe of red-brown crosses three segments from the wing case. Duration of the pupa stage about seven days.

TWO DISTINGUISHED SETTLERS.

BY W. HAGUE HARRINGTON, OTTAWA.

In the March number of Entomological News Dr. Horn records the capture at St. John, N.B., of *Carabus nemoralis*, Mull., by Mr. C. B. Riker, in April or May, 1891. I can confirm the occurrence of this species in the locality mentioned and can add from it a second species to our lists. On the 6th Sept., 1891, having the forenoon to spend in St. John I made a visit to the celebrated falls which pour up or down the river, according to the state of the tides, for which the Bay of Fundy is noted. I spent about half an hour searching for Coleoptera, and among the Carabidæ found under drift wood were two species of Carabus. As I had never captured specimens of this genus before, I was much pleased to find them, especially as they were different from any American species in my collection. For some time I could not identify them, but they proved to be *C. nemoralis*, Mull., and *C. granulatus*, Dej. Of the former I obtained five individuals (4 ♂, 1 ♀), and of the latter three (2 ♂, 1 ♀), besides a specimen which had the elytra so deformed that I let it remain, to be perhaps the progenitor of a new variety. As *C. cancellatus* had been recorded (although it has not yet been placed in the list) by Dr. Horn in Trans. Am. Ent. Soc., Vol. X., 270, 1883, as found at Wilmington, N.C., I thought for a time that my three specimens might belong to that species. I have now, however, after carefully examining Dejean's description and figures, and also by comparison with European specimens received as *C. granulatus*, satisfied myself that this is the species taken. The capture of this species recalls a specimen, dead and somewhat mutilated, which I picked up in Truro, N.S., some years ago, and which I then supposed to be a variety of *mæander*. The specimen was not kept as it was too much injured to be available for my cabinet, but from my recollection of it I think it must have been *granulatus*. Unfortunately there are few collectors in our Maritime Provinces, so that our knowledge of the occurrence and distribution of species is very small.

NEW NORTH AMERICAN HOMOPTERA—IV.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

Gnathodus impictus, n. sp.

Green, or yellowish green in the dried specimen; scutellum and all beneath quite strongly tinged with yellow. Corium whitish hyaline, nervures green and strong, especially in the male. Wings white, iridescent, nervures pale. Eyes blackish. Antennæ and legs soiled yellow tinged with green, especially on the posterior tibiæ. Otherwise immaculate.

Genital characters. Male: Valve short, hind edge but feebly arcuated. Plates broad and short, outer edge rounded, with a few short, stout, white spines; tips abrupt, narrow whitish, about one-half as long as the disc of the plates, placed nearly their own width from the sutural edge and approximated at apex. Pygofers moderately surpassing the plates, their leaf-like apices commencing at the extreme tip of the plates, where they are quite widely separated, and approaching posteriorly. Female: Last ventral segment long, slightly narrowed posteriorly and truncated at apex. Pygofers narrow, scarcely swollen at the middle, equalling in length the stout oviduct, disc armed with stout spines nearly to the base. Length 3½ mm.

New Jersey. Described from a single pair received from Prof. J. B. Smith, and labelled "New Brunswick, July 20."

Gnathodus abdominalis, n. sp.

Smaller than the preceding. Green, disc of the tergum brown, venter brownish green. Pronotum with three nearly obsolete longitudinal fulvous bands, continued over the basal field of the scutellum, where the lateral ones appear as fulvous-brown spots within the basal angles. Elytra whitish tinged with smoky on their apex, nervures concolorous but distinct. Wings slightly enfumed, nervures brown. Tibial spines pale; claws brown. In faded examples the colour becomes whitish or yellowish green with the fulvous bands obsolete, or nearly so.

Genital characters. Male: Valve large, as long as the two apical ventral segments taken together; apex angled, subacute. Plates but little surpassing the valve, narrow and pointed, fringed with stout spines. Pygofers long, their expanded tips slightly separated at base but approximated beyond. Length, 3 mm.

New Jersey. Described from two male examples received from Prof. Smith, and taken at New Brunswick, July 20th, and Jamesburgh, July

15th. This species differs from the preceding by its smaller size, the discoloured abdomen and the very distinct form of the male genitalia.

Athysanus comma, n. sp.

Form of *A. obsoletus*, Kirsch. Pale yellowish lineate with black and fulvous, anterior edge of the head with four black spots. Length 5 mm.

Female: Vertex flat, very slightly impressed within the obtuse anterior edge; apex less acute than in *obsoletus* or *plutonius*. A spot below each antenna, four on the anterior edge of the head, and a smaller one on the hind edge either side of the median line, black. Pronotum short, obscurely wrinkled behind the anterior submargin, posterior edge straight, anterior feebly arcuated; disc with four equidistant longitudinal strong brown vittæ, which become black where they touch the margins, the two central continued across the scutellum. All the femora and the posterior tibiæ lineate with brown above. Limb of the connexivum, and a slender line at its base, a spot on the apex of the last ventral segment, the sides of the oviduct, a large comma-shaped spot each side on the dorsal aspect of the pygofers, and an abreviated line on the apex of the tergum each side of the middle, black. Elytra pale; within the costal margin is a broad fulvous band which is continued around the apex and connects with a similar band within the sutural margin; claval suture marked by a slender black line, and exterior to this on the apical half of the corium is a similar and nearly parallel line.

Genital characters: Last ventral segment long, toward the sides thin and compressed around the base of the pygofers, hind edge with a broad, shallow concavity. Pygofers short and stout, their obtuse apex equalling the oviduct.

Iowa. One example received from Mr. C. P. Gillette.

Athysanus bicolor, n. sp.

Form of *A. Curtisii* but larger. Green, banded and lineated with black. Length, 3½ mm.

Head as in *Curtisii*, well produced before and tumid; front swollen; clypeus quadrangular, its broad apex exceeding the tips of the cheeks and a little concave; outer angle of the cheeks rounded. Face black; a broad transverse band below the eyes and sometimes the apex of the clypeus, greenish yellow; vertex pale greenish, two large contiguous spots anterior to the middle or the entire apex, black. Pronotum yellowish green, black anteriorly between the eyes. Scutellum pale, with a broad

black band covering its basal field and the base of the elytra. Elytra yellowish green, nervures concolorous; apical areoles, a large costal cloud beyond the middle sometimes extended along the centre of the antiapical areoles, a line adjoining the claval suture, and the commissural nervure, blackish fuscous. Wings white, nervures slender, brown. Legs and all beneath black; rostrum, tips of the anterior and intermediate coxæ, knees, tarsi, spines of the posterior tibiæ and the narrow edge of the ventral segments, pale; tergum black with a row of marginal pale spots; last ventral segment yellow, its sides and a heavy, double median line, not reaching its apex, black.

Genital characters. Female: Last ventral segment about the length of the preceding; hind edge feebly angularly concave and impressed toward the middle. Pygofers a little swollen at their middle; black with a broad yellow dorsal line. Oviduct far surpassing the pygofers, rufous.

Described from two female examples, one from Mississippi, kindly given me by Mr. Howard Evarts Weed, and a smaller specimen taken near Emporia, Kansas, by my brother Mr. M. C. Van Duzee.

In the pattern of its markings this species recalls the dark coloured specimens of *Deltocephalus debilis*, Uhler, but may at once be distinguished by the banded head and pronotum and the more obtuse anterior edge of the vertex.

Athysanus obtusus, n. sp.

Form of the preceding. Head well produced, tumid, as wide as the pronotum, apex obtuse, vertex pentagonal; soiled yellow or fulvous, with two large square black spots anterior to the middle encircled by paler. Front with a few short arcs and a large squarish basal spot black; above this on the edge of the vertex is a concentric black band, interrupted in the middle by a square pale spot at the tip of the head; a large spot below the antennæ and sometimes the ocelli black; outer margins and apex of the face dusky or black. Eyes dark brown, edged with pale behind. Pronotum well arcuated before; surface strongly transversely wrinkled, omitting the posterior and broad anterior margins, the latter paler with about eight black marks more or less coalescent. Scutellum pale, an angular black spot within the basal angles and a few brown lines on the middle. Beneath deep blue-black with one or two spots on the pleural pieces and sometimes the narrow edge of the ventral segments pale. Tergum blue-black, spotted on the margin with yellow or rufous. Legs pale testaceous, lineate below with black. Elytra deep fulvous-

brown or fuscous, nervures distinct, pale, the commissural and those delineating the apical areoles heavy and brown. Wings whitish, highly iridescent.

Genital characters. Male: Valve small, black, edged with pale. Plates broad, but little longer than the valve, cut squarely off on their apex, with a few pale submarginal spines; yellowish, clouded with black beyond the valve. Pygofers nearly twice the length of the plates, blackish, fulvous at apex, with a broad pale yellow median band, their inner apical angles rounded off so as to expose the pale anal tube. Female: Last ventral segment short, hind edge feebly concave; pygofers broad, their pale acute tips much exceeded by the obscurely rufous oviduct.

Length, 3-3½ mm.

Mississippi. Described from one male and three female examples received from Mr. Howard E. Weed.

Deltocephalus flavocostatus, n sp.

Small; fuscous-brown; antennæ, legs, costal margin of the elytra, and a few small spots on the vertex yellow. Elytral nervures pale. Length, 3 mm.

Male: Head shorter, more conical, with the anterior edge more rounded and the vertex more convex than in the most of our species. Vertex marked with about ten yellow points, the apical four form a rhomboidal figure, two are on the ocelli, another pair are placed against the inner margin of the eyes, and on the middle of the basal margin are two elongated marks, in one example nearly obsolete. Face black, closely punctured; clypeus quadrangular, sutures straight; loræ well rounded outwardly, cheeks wide, forming a broad margin beyond the loræ and attaining the apex of the clypeus. Outer angles of the cheeks, a dot below each ocellus and sometimes a few short arcs on the front inferiorly, yellow. Pronotum nearly smooth; anterior submargin thickened and black, with about five yellow points indicating as many very obscure longitudinal lines; hind edge moderately concave. Scutellum black with traces of four longitudinal pale lines. Beneath deep black, the narrow edge of the ventral segments paler, propleura margined with yellow behind. Legs soiled yellow; claws and basal joint of the hind tarsi black. Tergum black, narrowly margined with pale. Elytra fuscous-brown; nervures pale bordered with blackish; costa bright yellow as far as the antiapical areoles with a blackish border within, which extends over the apical areoles and includes two crescentic white marks beyond the yellow costal vitta; extreme apex white.

Genital characters: Valve longer than the last ventral segment, obtuse, brown edged with pale. Plates about one half longer than the valve, narrowed at the apical third; brownish yellow clouded at base, with a few long pale submarginal spines.

Mississippi. Described from two males received from Mr. Howard Evarts Weed.

ENTOMOLOGY FOR BEGINNERS—PACKING INSECTS FOR TRANSPORTATION.

BY H. F. WICKHAM, IOWA CITY, IOWA.

By request of Mr. Fletcher I add a few remarks to his article in the January number on "Killing, Preserving and Relaxing Insects," though the subject is so well treated there as to leave little room for additional comment.

The action of the cyanide bottle cannot be depended on as effectual in such a short time as Mr. Fletcher mentions, except in the case of the most tender insects, many Rhynchophora will live there for several hours unless the bottle is quite freshly prepared, and I know of one case in which a *Coelocnemis* remained alive all night confined in a bottle strong enough to quickly overcome the large southwestern species of *Cleonus*. For most northern and eastern insects, however, a short space of time in the bottle is sufficient.

The tubes spoken of should be made of tolerably stiff paper—old envelopes answer nicely—but it should *not* be coloured, as by the common mode of relaxing the insects while still in the tubes there is danger of staining the more delicate ones. Each tube should have a compact wad of cotton placed in the bottom, then the insects (if they are elongate species or have long legs and antennæ) should be carefully dropped or pushed in, head foremost, so as to reduce to a minimum the danger of breakage. Now place another wad of cotton on them and close up the tube, which may be easily done by tucking in the edges with the fingers. In the case of such insects as Pterostichus it is my practice to place four specimens, say the size of *mutus*, together in a bunch so that the heads all point the same way and the legs lie close together, the backs being outermost; now by introducing the heads of all at once into the open end of a tube a little pressure on the posterior extremities will pack them nicely in place. After they are in, if it is desired to put another set of four in the same tube it is much better to place a small but firm wad of

cotton between the two in order to protect the antennæ of the second lot from interfering with and perhaps breaking the hind tarsi of the first. Round insects with short legs such as Byrrhidæ and Histeridæ need no such care. They may be dropped in one after the other only taking care that the cotton is packed tightly enough to prevent any rolling around.

In relaxing insects that have been put up in tubes I much prefer to remove them first, as wet cotton clings to legs and claws so much more tenaciously than dry. Others, however, may find it easier to disengage them from this sticky cotton than to handle them dry.

Never pack these tubes, containing insects, in a tight tin box for they are almost certain to mould and spoil. Be also careful not to pack insects loose in cotton unless you want to leave most of the antennæ and legs behind. I remember that during the first year spent in the south-west I put up a lot of *Eleodes*, *Embaphion*, etc., in cotton—simply putting first a layer of cotton in the box and then one of insects—and hardly a specimen came out whole.

The method I now use, in packing for transportation insects of considerable size, when taken in numbers, is that recommended by Drs. Leconte and Packard. Taking a box of the right size (thread boxes do nicely for insects the size of *Nyctobates* or smaller) a layer of cotton about one-eighth of an inch in thickness is first laid neatly on the bottom. Over this a piece of thin tissue paper is placed; next I take a wisp of cotton and roll it between my hands, making a roll long enough to reach along one side of the box, with two more, one for each end. Now, beginning at one end of the box place your beetles in an even row all along one side, having first laid the roll of cotton in to keep the heads from touching the box. When that row is full make another roll of cotton, place it carefully back of these beetles, to keep the next row from touching them, and put in more beetles as before. When one whole layer is in position on the tissue paper, cover them first with another piece of paper, then another layer of cotton, then more paper, followed by another layer of beetles. From a written description this seems a tedious process, but it is much quicker than putting them in tubes, and is absolutely safe. Specimens of beetles are bound to carry if packed thus in wood or pasteboard boxes strong enough to withstand such pressure as they may be subjected to—but never use tin.

My remarks apply chiefly to beetles, and I do not recommend these modes of preparation for soft-bodied or delicate insects like the Neuroptera or Lepidoptera.

NOTES ON NORTH AMERICAN HESPERIDÆ.

BY EUGENE MURRAY AARON, PH. D., PHILADELPHIA, PA.

From time to time for the past ten years I have been in the habit of receiving, from various collectors in this country and Europe, specimens of North American *Hesperidæ* for comparison and identification with my large collection, which has been justly famous for its completeness. As this collection is now no longer in my possession, being now the property of my friend C. B. Aaron, of Philadelphia, and as I have transferred my allegiance from entomology to ethnology it has occurred to me that it will be well for me to give here to the students of the *Hesperidæ* the benefit of such tables, notes and compilations as have, in years past, been of value to me in the identification of the species in this difficult family.

KEY TO SOME OF THE GENERA OF HESPERIDÆ.

Knob of antenna bent or curved ..... A.
Knob of antenna straight ..... B.

A. { Knob abruptly bent ..... C.
   { Knob curved ..... D.

C. { Bent portion of knob not over ⅓ entire length ..... E.
   { Bent portion of knob a long fine point, often as long as remainder of knob ..... *Eudamus.*

E. { Abdomen reaching or surpassing the anal angle. *Pamphila* (1)
   { Abdomen scarcely reaching anal angle ..... *Amblyscirtes.*

D. { Knob of antenna elongate or ovoid ..... *Pyrgus* (3)
   { Knob of antenna spindle-shaped ..... H.

H. { Hind wings angulated or crenulated ..... *Systasea.*
   { Hind wings not angulated or crenulated ..... K. (2)

K. { Two basal joints of palpi bright coloured beneath ..... *Pholisora.*
   { Two basal joints of palpi black or fuscous beneath ..... *Thanaos.*

B. { Tibiæ with spurs ..... M.
   { Tibiæ without spurs ..... *Carterocephalus.*

M. { Last joint of antenna rounded, no spine ..... N.
   { Last joint of antenna with short slender spine ... *Ancyloxypha.*

N. { Antenna ⅓ length of primaries, tibiæ nearly naked. *Copæodes.*
   { Antenna ½ length of primaries, tibiæ with long hairs ..... *Thymelicus.*

It must be remembered in using this table that it is arranged largely to aid in the differentiation of species along the generic lines at present accepted by most American Lepidopterists. The following remarks will

show wherein it is believed to be defective in nature. The numbers refer to those used in brackets in the table :—

1.—Speyer has pointed out, in the first edition of Edwards's Catalogue, the variability in the antennal knob in the genus *Pamphila* as at present characterized. Close examination will show that in *Leonardus*, *Nemorum*, *Phylæus*, *Uncas*, *Comma*, *et al.*, the bent portion is not more than ¼ as long as the basal portion of the knob, and in *Leonardus* it is often a thick cone-shaped piece. In an example of *Metea*, in the collection of the American Entomological Society, the same cone-shaped termination is present, while in a species in the collection formerly in my possession, the terminal spine was nearly as long as the basal portion. Speyer accredits to *Metea* a thick blunt cone.

2.—In describing the new genus *Luitneria* (now *Systasea*), Speyer compares it with *Thanaos (Nisoniades)* and I have here, consequently, used the crenulation of the wings as a differentiating character. This, however, will not do in the case of *Nessus*, which Mr. Edwards now strangely places with *Pyrgus*. In my opinion both *Zampa* and *Nessus* belong to one genus, and the erection of the genus *Systasea* was an unnecessary burden to the synonymy.

3.—I have made no allowance for the genus *Leucochitonea* for the simple reason that I do not believe it can be separated from *Pyrgus* along any lines so far accepted by Speyer and others as affording generic demarkation. A specimen of *Pyrgus oceanus*, formerly in my possession, has one antenna true to Speyer's rule, while the other is distinctly as in *Eudamus pylades*. This might be taken to be a sport were it not for the fact that it is along this line that the species of the genus, otherwise closely related, are divergent.

The genera *Pyrrophaga*, *Erycides* and *Megathymus*, I have not attempted to define here. It has been my purpose simply to compile a table that would aid in the separation of those species commonest in American collections which my acquaintance with such collections leads me to know are most frequently misnamed and misplaced. In subsequent papers I shall discuss certain specific differences which are most likely to be confusing to students of this little-understood family.

NEW NORTH AMERICAN MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Teras comandrana, n sp.

Expanse of wings 13 mm. Head, palpi, thorax, and basal half of forewings, light yellowish-brown or fawn coloured. A large cinnamon-brown triangular spot rests on the costa, extending from the middle to the outer fourth, and the apex extends nearly half way across the wing. The outer part of the wing is light cinnamon-brown, and the whole surface is crossed by numerous oblique, irregular, metallic bands, which are visible only in an oblique light. A row of minute black tufts along the inner side of the costal spot, two or three more near the fold below, one on each side of the fold at the basal third of the wing, and three near the middle of the wing at the outer fourth. Fringe concolorous with the outer part of the wing.

Upper side of the abdomen, hindwings above and beneath, and the underside of the forewings, light steel gray, with a silky lustre. Fringes lighter.

The larva of this species which was found in Amherst, Mass., May 24, 1890, feeding on *Comandra bellardi*, is light green above and much lighter beneath. The head and thoracic shield are jet black, with the usual scattering hairs; the other segments have the usual protuberances of a whitish colour. This larva pupated June 11th, and the moth emerged June 21, 1890.

Described from three examples, one from Amherst, Mass., and two from Pennsylvania. I have two others from Texas which differ from the above description only in being much lighter in colour.

Cacoecia magnoliana, n. sp.

Expanse of wings from 21 to 25 mm. Head, thorax and forewings, fawn coloured, the last somewhat darker and with purplish reflections on the middle field. The costal fold of the male, and the costal spot are cinnamon coloured; and there is an oblique, elongated, reddish-brown spot arising from near the base of the hinder margin, a similar spot rests on the fold below the outer part of the cell, and a smaller, elongated spot of the same colour lies in the outer part of the cell. These three spots are dimly outlined with whitish scales. The outer part of the wing is dull whitish, and crossed by a somewhat ill-defined, smoky-brown, curved band, extending from the costal spot to the anal angle. The outer edge

of the wing is marked with black reticulations from the apex, where they are widest, nearly to the anal angle.

The hindwings and abdomen above are pale fuscous. The under side of the forewings is pale fuscous, lighter along the costal and hinder margin. The under side of the hindwings is pale yellow with fuscous reticulations at the apex.

Bred from *Magnolia acuminata* by Mr. M. V. Slingerland at Ithaca, N. Y.

Pyrausta magdalena, n. sp.

Expanse of wings 16 mm. Head ochre-yellow with a whitish line over each eye. Labial palpi, nearly as long as the head and thorax, porrect, laterally compressed, slightly bushy, whitish within, ochre-yellow along the middle of the outside, and fuscous along the edges and at the end.

Thorax, ochre-yellow with a metallic stripe on each side, extending from the head back across the patagiæ.

Forewings ochre-yellow with a very slight reddish tinge along the costa. Three metallic stripes extend outward from the base of the wing, one along the costa, and one along each margin to a similar stripe which starts from the basal third of the wing and curves around to the middle, where it joins the central stripe, then runs obliquely across to the middle of the hinder margin. Two parallel curved stripes cross the wing near the outer margin, the inner one of which is more or less bent inward on vein 2. All these stripes are metallic and edged on each side with black scales.

Described from three examples, one from Texas and two from Florida.

I take great pleasure in naming this beautiful little moth for a most estimable lady, the wife of Rev. Geo. D. Hulst.

I formerly supposed this species to be *Botis plumbofascialis*, Led., which he said was from North America; but this was a mistake, as his type is labelled "S. Africa," and proves to be the same as *Botis plumbatalis*, Zell. Mic. Caff. p. 47.

Coleophora fletcherella, n sp.

Expanse of wings from 10 to 12 mm. Head, palpi and basal joint of the antennæ, yellowish steel gray. Body, legs and wings above and beneath, plain steel gray, much more intense in fresh specimens.

The palpi are without tufts, the basal joint of the antennæ with a

slight tuft, and the remaining joints of the antennæ and also the joints of the tarsi are steel gray annulated with white.

The cases are brown, composed of a portion of the leaf, cylindrical or fusiform, slightly compressed laterally, and with a more or less distinct ridge above and beneath. The mouth is more or less oblique, with the edge flaring out slightly. One side of the case is covered with fine hairs while the other is smooth, showing that the larva constructs its case from the upper and under sides of the leaf.

Described from three specimens received from Mr. James Fletcher, for whom I name this species, and who bred it from apple. I have also received the same species from Prof. Lintner who also bred it from apple.

NOTES AND DESCRIPTIONS OF BOMBYLIDÆ.

BY D. W. COQUILLETT, LOS ANGELES CAL.

Exoprosopa, Macq.—At the present time no little confusion exists in regard to those species in which the brown of the wings does not form crossbands, and I am unable to give a table for separating these species that would be of much use to the student. Those species from the United States which possess crossbands of this kind, and which always have the anal and axillary cells more or less brown, may be tabulated as follows :—

1. Wings brown, the apex broadly, and a large spot in the discal cell, hyaline ..... *emarginata*, Macq.
   Wings not marked like this 2
2. The brown crossband at apex of discal cell reaches the hind margin of the wing 3
   The brown crossband does not reach the hind margin 4
3. A pure hyaline crossband near base of wing ..... { *caliptera*, Say. / *dorcadion*, O. S.
   A yellowish but never pure hyaline crossband near base of wing ..... *decora*, Lw.
4. Extreme apex of marginal cell hyaline 5
   Extreme apex of marginal cell brown ..... *fascipennis*, Say,
5. With a brown spot at base of vein between the second and third posterior cells 6
   Without this spot, the wing at this point being pure hyaline. *grata*, n. sp.
6. Base of discal cell more or less hyaline 7
   Base of discal cell wholly brown ..... *eremita*, O. S.
7. First posterior cell open, or closed near the margin of the wing. *doris*, O.S.
   First posterior cell closed and long petiolate ..... *iota*, O. S.

Exoprosopa grata, n. sp.—Black, lower part of front, face except in the middle, sides of anterior half of oral margin broadly, scutellum except its extreme base, sides of abdomen on basal half, venter except sometimes at the apex, reddish, legs sometimes also reddish. Tomentum of front and face brassy yellow, the pile black; face concave, considerably produced below; proboscis never projecting more than the length of its labellæ beyond the oral margin; first joint of antennæ three times as long as the second and about equal to the third, the latter in profile gradually tapering from base to apex, about twice as long as the terminal style; tomentum of occiput silvery white. Tomentum of thorax mixed black and brassy yellow, pile of dorsum black, that of ends and sides yellowish, the bristles black; pile of pleura light yellow, that above the middle coxæ white, on all the coxæ mixed yellow and black. Pile and bristles of scutellum black, the tomentum mixed black and brassy yellow. Tomentum of abdomen black and brassy yellow, the yellow forming a crossband at base of the second segment and a large spot on each side of the third, fourth, fifth and sixth segments, most extended on the fourth where it forms a broadly interrupted crossband; tomentum of the seventh segment silvery white; pile of sides abundant, that on the first segment and anterior third of the second yellowish, on rest of abdomen black; tomentum of venter white, mixed with a few black ones posteriorly, the the pile yellowish and black. Tomentum of legs mixed black and brassy yellow, front tibiæ destitute of bristles, clause of front tarsi scarcely perceptible. Wings hyaline, costal cell yellowish, base of wing to beginning of basal cells brown, the hyaline part with two brown crossbands; the first one begins at costal cell in base of the marginal, fills apical half of the first basal, apical fourth of the second basal, base of discal and extreme base of the third posterior, basal third of the fourth posterior, last half of the anal cell except its extreme apex, also fills last three-fifths of the axillary cell, besides forming a border to the extreme base of the second vein; the second brown band fills the middle third or more of the marginal cell reaching apex of the costal cell, crosses the first submarginal and first posterior cells near the middle of each, fills extreme apex of the discal and the upper corner of base of second posterior cell, not reaching the third posterior cell. Length 13 to 16 mm. Merced County, California, and Washington. Four specimens; in July.

Nearest related to *eremita*, O. S., but readily separated from it, and from *doris*, O. S., by the second brown crossband of the wings never

reaching the third posterior cell, and also by the fact that the crossband of light coloured tomentum on the fourth segment of the abdomen is always broadly interrupted in the middle.

Exoprosopa iota, O. S.—Originally described from Mexico. I have specimens which I collected in Los Angeles county, California. It is almost certain that this is simply a form of *doris* in which the first posterior cell is closed and petiolate. In the CANADIAN ENTOMOLOGIST for January, 1887, pages 12 and 13, I called attention to the variability of this character in specimens of *doris* captured at the same time and place, stating that in view of this fact Rondani's proposed genus *Argyrospila* must be rejected—an opinion previously expressed by the learned Austrian Dipterist, Dr. Schiner, but which fact I was not aware of at the time of writing the article above mentioned.

Geron, Meigen.—Up to the present time but a single species belonging to this genus has been reported from the region west of Texas; this is *albidipennis*, Loew., which is not rare in Southern California. My collection contains two other as yet undescribed species from this State, both of which will be readily distinguished from the above species by the form of the third antennal joint. In the latter this joint when viewed from the side is seen to taper very gradually to the tip, the outline being narrowly lanceolate, about six times as long as broad. The other two species may be characterized as follows:—

Geron fasciola, n, sp.—Head black, front and face silvery white pollinose in the ♂, light grey in the ♀, very short, sparse white pilose; first joint of antennæ one and a fourth times as long as the second, the third joint one and a-half times as long as the first two, in profile scarcely more than twice as long as broad, tapering slightly to the apex, which is obliquely truncated and bears a small tubercle which extends obliquely upward; proboscis, excluding the labellæ, one and a-fourth times as long as the head, tip of palpi reaching its middle, occiput light grey pollinose, and sparse white pilose. Thorax black, the margins light gray pollinose, that in middle of dorsum brown, continued in two median lines anteriorly; very short sparse white pilose; pleura, coxæ and scutellum light gray pollinose and sparse white pilose. Abdomen black, hind margin of each segment white, most extended on the first segment; entire dorsum light gray pollinose and sparse white pilose; venter white, sparse white pilose. Legs black, light gray pollinose, apex of each femur narrowly, basal half or more of each tibia, and base of each metatarsus, yellow, the

pile sparse, white; no bristles nor spurs. Wings pure hyaline, veins yellow, the costal from apex of auxiliary to apex of fourth vein brown; small cross-vein at or slightly before the middle of the discal cell, great cross-vein straight, last two sections of the third vein subequal in length, apex of second submarginal cell half as long as the last section of the third vein. Length 2½ to 4 mm. Merced County, California. Five males and four females in August.

Geron capax, n sp.—Black, light gray pollinose, that in middle of dorsum of thorax brown, in the ♀ continued anteriorly as two median lines, but in the ♂ the entire dorsum is brown, with the exception of two indentations on the front end and a smaller one each side, situated on the thoracic suture; pile of entire body sparse, whitish. First joint of antennæ nearly twice as long as the second, the third joint twice as long as the first two, in profile four times as long as wide, of nearly an equal width, the upper corner cut away for half the width of the joint, leaving the lower half projecting far beyond it, the apex broadly rounded. Proboscis, excluding the labellæ, one and a-half times as long as the head, tip of palpi reaching its last third. Base of each abdominal segment darker than the remaining portion. Wings hyaline, apex of subcostal cell yellow, the veins brown; small cross-vein slightly before middle of discal cell, great cross-vein bisinuate, last two sections of the third vein subequal in length, apex of second submarginal cell one-third as long as the last section of the third vein. Length 6 mm. Orange County, California. Two males and three females.

The colour of the halteres is not the same in any two specimens. The relative length of the proboscis is also variable; in one of the males it is fully two and a-half times as long as the head.

A SARCOPHAGID PARASITE OF CIMBEX AMERICANA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

Recently Professor Aldrich, of Brookings, So. Dakota, sent me two specimens of a Sarcophagid which he had bred from *Cimbex*. They prove to belong to the old genus *Sarcophaga*, and are described below. It seems impossible to identify them positively with any of the published descriptions.

Sarcophaga cimbicis, n. sp. ♂.

Eyes dark brown, bare; front one-fifth width of head, silvery white,

frontal vitta slate-black, about one-half width of front; sides of face and facial depression silvery white, with a brassy lustre, the sides of face with a row of bristles below near the eye-margin; cheeks silvery, wide, bristly; vibrissæ stout, decussate, inserted on oral margin, facial ridges bare except several short bristles above vibrissæ; frontal bristles descending to base of third antennal joint, two posterior pairs directed backward, no orbital bristles; antennæ blackish, third joint hardly twice as long as second, moderately wide; arista concolorous, 3-jointed, thickened on basal third, plumose on basal half or more; proboscis brownish, almost as long as height of head, stout; palpi blackish, moderately stout, bristly; occiput silvery white, covered with black bristles. Thorax silvery white, with three heavy black vittæ; scutellum silvery white, with a subapical divergent pair of macrochætæ, a very weak decussate apical pair of bristles between them, a decussate weak subdiscal pair of bristles, and two lateral pairs of macrochætæ. Abdomen about as wide as thorax, silvery, marbled with gray, with a more or less distinct median dark line; hypopygium rufous-yellow; first and second segments with a lateral macrochæta; third with about three lateral, a median marginal pair, and some shorter marginal bristles between; anal with a marginal row of about twelve. Legs blackish, femora silvery white, tibiæ bristly, claws and pulvilli elongate, pulvilli smoky black. Wings grayish hyaline, longer than abdomen; apical cell widely open before tip of wing, fourth vein with wrinkle and slight stump at bend; apical cross-vein deeply bowed in, hind cross-vein sinuate, nearer to bend of fourth vein; tegulæ nearly white, halteres tawny yellowish.

♀. Differs as follows: Front nearly or quite one-third width of head, frontal vitta about one-half width of front; three hind pairs of frontal bristles directed backward, the hindmost pair much the longest and the forward pair of the three much the shortest; two stout orbital bristles directed strongly forward. The weak decussate apical pair of bristles on scutellum is apparently wanting (there are no scars apparent), the weak subdiscal pair of bristles are not decussate. Abdomen broadened, much wider than thorax, macrochætæ nearly the same; anus rufous-yellow, fringed with marginal bristles. Claws and pulvilli much shorter.

Length of body, 7 to 8 mm.; of wing, 6½ to 7 mm.

Described from one male and one female, bred by Professor J. M. Aldrich from cocoons of *Cimbex Americana*. Issued May 30 and June 2. Brookings, So. Dakota.

OVIPOSITING IN THE GENUS ARGYNNIS.

BY HENRY SKINNER, PHILADELPHIA, PA.

I wish to make a contribution to the literature of the subject of "egg dropping," and place on record in an entomological journal an observation I made nine years ago. I do this with the object of calling general attention to this subject, which I think an interesting one, and in hope that lepidopterists may be on the look out for this method of ovipositing in all the species of the genus. In the Proc. Acad. Nat. Sci., Phil., vol. 35, p. 36, I called attention to the fact that *Argynnis cybele* deposited its eggs while on the wing, or in other words, dropped the eggs from a height to the herbage below. Mr. Scudder in Butt. East. U. S. and Can., vol. 1, p. 560, says: "The eggs are laid upon the leaves and stalks of the food plant, *and not, as stated by* H. Skinner, dropped from a distance upon the herbage." He further says: "It is not an altogether uncommon thing for an egg to become attached to the scales at the top of the abdomen of a butterfly, or upon one of the hind legs; and it is possible that in the movement of the wings in flight or poising, such an egg might have been swept or brushed off during Mr. Skinner's observation." Mr. Scudder tries to disprove my statement by a very ingenious supposition. I call attention to the method of ovipositing he describes, to see if anyone has ever observed it. I did not state that *Argynnis cybele* invariably dropped its eggs, but I have since learned that this method is by no means uncommon in the genus. I have repeatedly observed *A. myrina* hovering over wet fields, where violets grew in the herbage, dropping its eggs indiscriminately about. In this journal, vol. XXI., p. 130, will be found some remarks on this subject, and in a foot note it is stated that Mr. Aaron has observed the same habit in *A. bellona*, and is strongly of the opinion that strange motions frequently observed in *A. diana* in Tennessee are to be accounted for in the same way. The subject under discussion was brought fresh to my mind by reading the very interesting article by Mr. Wright (Mar. No., vol. 24) who says:— "Different species of *Argynnids* have different methods of ovipositing, *but none that I know of require a plant.* Other species, as *semiramis*, oviposit *on the wing without ever alighting*, but hovering over suitable places dropping the eggs at pleasure." I was greatly pleased too, on reading the above, to find my early observation confirmed by such an acute observer. I can give no reason for this method, and Mr. Wright's reason for such actions would hardly hold good here. He says:—"The reason

for this peculiar habit seems to be to avoid small lizards which abound and which are alert to seize any flying insect." The species which have been observed dropping their eggs are *cybele, semiramis, myrina, bellona, diana (?)*. Are there others ?

NOTES ON MELITTIA CETO, WESTW.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

The notes on this species by Dr. Kellicott, in the February number of the CANADIAN ENTOMOLOGIST, induce me to place on record some of the observations made by me during the past year and used in my annual report ; and also to call attention to a very old record that in part answers the question—Is the species double-brooded ? Looking over the MSS. drawings by Abbot in the British Museum, I found a picture of this species, and to it the following note :—" The caterpillar of this sort lives in and eats the stalk of Cymbling vines, pale brownish white, resembling a maggot ; spun up in the ground 16 July, bred 11th Aug. Also taken 19th July. It flies in the day, frequents cymbling and pampion vines ; not common."

This record refers to the vicinity of Savannah, Georgia, and is definite enough to prove that an early brood comes to maturity in July and August, leaving quite a sufficient time for a second brood of larvæ to mature in early October. I believe the occurrence of Dr. Kellicott's specimen in late August to be abnormal, and not a usual thing in that locality. In New Jersey I feel convinced that we have but a single brood, one that has a long period of flight and is of slow growth in the larval stage. Near New Brunswick, N. J., the moth does not appear until the middle of June, and on Long Island, as I am informed, the latter part of June and early July is the date of the first appearance. A much earlier date would be destructive to the species since squash vines are not planted here until about the middle of May or later, and do not begin to be of size to support larvæ until June or July. On the 26th of June I found eggs numerous, but not until July 6th did the first larva appear, and the last of the eggs collected on the 25th June, hatched on July 11th, giving at least a 15 day period for the egg. Moths were still flying at that time and continued for some days later. It is interesting to note that just about the time eggs begin to hatch generally in New Jersey, Abbot records his larva as full grown and ready to spin up. The record of the

capture of the imago on July 19th raises the other question :—Were these belated individuals of the spring brood, or abnormally early specimens of the summer brood ?

Eggs laid at about the middle of July would not hatch until early in August, at a time when those first hatched would already be nearly one month old. In September I found full grown and less than half grown larvæ together in one stem, and the full grown larvæ were getting ready to spin up. Those half grown at that time increased very slowly, and up to the first weeks in October were still feeding. Meanwhile, the larvæ that spun up early in September were quiescent within the cocoon, and up to date—February 23rd—none of them have transformed to pupæ. To get two broods into one season, all the periods must be considerably shortened and the development must be much more rapid.

For these reasons I believe that we have in New Jersey and northward one brood only ; that the time of appearance of the imago extends over nearly if not quite one month, and that six weeks may be the period of flight ; that at least 15 days are required for the eggs to develope ; that the larva requires from seven to eight weeks to come to maturity ; that the larva remains unchanged within the cocoon during the winter. The date of pupation and the period passed in that stage has not yet been ascertained. I hope Dr. Kellicott will be able to ascertain this positively, and thus complete the life history of the insect. The economic problem of how best to deal with the species need not be discussed in this connection, but is much simplified by the better knowledge we have of its habits.

OBITUARY.

THE ABBÉ PROVANCHER.

It is our painful duty to record the death, in his 72nd year, of the Abbé Léon Provancher, who for many years, despite great discouragements and disadvantages, laboured zealously and assiduously to develope and disseminate a knowledge of the natural history of Canada, and especially of his native province. He was born in 1820, at Becancour, Que., and for some years was Curé of Portneuf, and one of his earlier entomological writings was a list of the Coleoptera of that district. Compelled by enfeebled health to relinquish the regular and more active duties of the ministry, he removed to Cap Rouge, near Quebec, and

devoted his remaining time and strength almost entirely to the study of the natural sciences. In 1869 he commenced the publication of the *Naturaliste Canadien*, and, notwithstanding many discouragements, completed in 1891 the twentieth volume, when its issue had reluctantly to be abandoned, through the Quebec Government refusing to continue the scanty annual grant it had received. As early as 1858 Provancher published an elementary treatise on botany, and in 1862 his Flore du Canada. Subsequently he devoted his attention specially to entomology, and in 1874 commenced his Faune Entomologique du Canada. Vol. I., treating of the Coleoptera, was completed in 1877, with three supplements in 1877, 1878 and 1879. Vol. II. was commenced in 1877 and completed in 1883, and contains the Orthoptera, Neuroptera and Hymenoptera. In 1885–1889 he published Additions aux Hymenopteres, and issued Vol. III. upon the Hemiptera, which was completed in 1890. He was also an enthusiastic conchologist, and his last publication was a treatise upon the univalve molluscs of the Province of Quebec. His writings include the account of a pilgrimage to Jerusalem, an excursion to the West Indies, treatises on agriculture, etc. He will be best known, however, by his entomological work, and as he described a large number of new species and genera, particularly of Hymenoptera and Hemiptera, it is sincerely to be hoped that his collections may be placed where the types will be carefully preserved and be accessible to students of entomology.

There is a disposition on the part of some American students to ignore the work of Provancher, and to accuse him of want of care, etc., in the determination of genera and species. The enormous disadvantages under which he laboured must, however, be considered, for he was remote and isolated from libraries, collections and fellow-workers, and in his writings he often laments the fact that so few could be found to take any active interest in his pursuits, or to assist him in his labours. His entomological work would have been more exact and complete had not the publication of the *Naturaliste* greatly interrupted his investigations, and forced him to spend much of his time in other directions. His labours had the result of starting natural history collections in some of the colleges in the Province of Quebec, but our French citizens do not appear to have any special leaning to the sciences he loved, and he has left behind him no entomological student of any distinction. Above all Provancher was an ardent Canadian, strongly imbued with love of his race, language and religion, and often in his writings he impresses these sentiments upon his readers. A few years ago he was elected a Fellow of the Royal Society of Canada, and he was also a member, active or honorary, of many other societies. W. H. H.

A NEW ISCHALIA FROM VANCOUVER ISLAND.

BY W. HAGUE HARRINGTON, OTTAWA.

Ischalia Vancouverensis, n. sp. Length 7½ mm. Flavo-testaceous, abdomen, disc of elytra and middle of antennæ purplish-black. Head deflexed, polished, prominently rounded between antennæ; eyes moderate, emarginate, coarsely granulated; antennæ reaching to apex of humeral pale spot, stout, first joint swollen, second small, remaining joints more elongated, gradually shortened, terminal joint acutely pointed, three basal and two terminal joints rufo-testaceous, intervening six blackish or piceous. Thorax bell-shaped, about as broad as long, rounded and elevated anteriorly with a shallow median sulcus, from which a carina runs to the posterior margin and projects in a sharp point; a deep transverse impression in basal third; base biemarginately truncate, with angles produced in blunt points; scutellum prominent, rounded at apex. Elytra with disc depressed, flattened, strongly confluently punctured, a prominent humeral costa extending nearly to apex, marginal costa prominent, acute, disc purplish-black, elongate humeral spot and all the margin testaceous. Abdomen purplish-black, alutaceous.

Described from six males from Comox, Vanc. Isd., received from Rev. G. W. Taylor in a very interesting and valuable collection of Coleoptera of Vancouver Island. Differs from *Ischalia costata*, Lec., in having the head unicolorous with thorax and legs, the abdomen entirely purplish-black, etc.

CORRESPONDENCE.

THE CUCUMBER MOTH.

Dear Sir,—I have the pleasure of announcing the addition to the Canadian list of that attractive Pyralid *Eudioptis nitidalis*, Cram., captured by Mr. T. H. Hill, of this place, in his garden last summer. It is known as the Cucumber Moth, in distinction to its congener the Melon Moth, *E. hyalinata*, Linn., both of them reported to be at times quite destructive to these crops in the Southwestern States. It is now over ten years since I captured the first known Canadian specimen of *E. hyalinata*, and it has been rarely taken since, and it is not known to be spreading, so that *E. nitidalis* may never become to us anything more than an exceedingly desirable cabinet specimen. Mr. Hill has kindly surrendered his unique to the interests of the Society. He has also most generously contributed his only specimen of that rare beetle *Hydrophilus ovatus*, which was wanting in the Society's collection.

J. ALSTON MOFFAT, Curator.

London, Feb. 18, 1892.

Mailed April 28th.

The Canadian Entomologist.

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SYNONYMICAL NOTES ON SOME HETEROCERA IN THE BRITISH MUSEUM.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

During the latter part of September, and early in October, 1891, I spent two weeks in London, and most of the time in the entomological rooms of the British Museum. My aim was, primarily, to identify the noctuids described by Walker, and in this I succeeded, the MSS. incorporating the notes there made being now in the hands of the printer. So large is the material in this magnificent collection, that I found opportunity for only a very hasty glance at other families of the Heterocera, and on a few species only I made brief notes. So far as they are synonymic they are here given.

Alypia crescens, Wlk.

1856—Wlk., Cat. Lep. Brit. Mus., Het. vii., 1774.

This is the same as *Alypia grotei*, Bdv., Lep. Cal., 1868, 70. Walker's name has priority. I have not the reference to Herrich-Schæffer's *Agarista bimaculata*, which Mr. Grote, Bull. Buff. Soc. Nat. Sci. i, 31, doubtfully refers here. Mr. Stretch in 1876, Wheeler's Rept. v., 802, gives *bimaculata*, H.-Sch., as the species, and cites *grotei* as a synonym of it. *Alypiodes flavilinguis*, Grt., Trans. Kans. Ac. Sci. viii., is another synonym, *fide* Mr. Henry Edwards in Papilio iv., 13. The genus *Alypiodes* is probably a good one, and it is also probable that Herrich-Schæffer's name will be found to ante-date Walker's, so that the species will probably remain as given by me in the recent List.

Eudryas Stæ Johannis, Wlk.

1856—Wlk., Cat. Lep. Brit. Mus., Het. ix., 144.

The type is marked "Taken on the church door at Horsley Downs." There is nothing in the specimen or record to authorize the reference of this species as North American, and yet this is probably correct. The insect is like *grata*, with slightly suffused primaries and deeper yellow immaculate secondaries. It is probable that in some way the pupa of

the insect was transported to England and through the vicissitudes encountered an aberration was produced. I have no hesitation in referring the species as a suffused aberrant *grata*.

Comacla simplex, Wlk.

Comacla murina, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxi., 276.

Both the above species are the same as *Vanessodes clarus*, G. & R., Trans. Am. Ent. Soc., iii., 176, and Walker's names, generic and specific, have priority. The reference above given refers to *C. murina*, Wlk. The reference to *C. simplex*, Wlk., I have mislaid in some way, and have not at present access to the books to replace it. The name is earlier than *murina*, however, if my recollection serves, and must stand for the species. This unites numbers 994, 995 and 991 of my list. East Florida is given by Walker as the locality for the species ; but the specimens are probably from Texas. Quite a number of species credited to "East Florida" in the British Museum are almost certainly from Texas.

Cothocida nigrifera, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 499.

This was described among the Limacodidæ by Walker, and is No. 1213 in my list. The type specimen is a species of *Crocota* with very dark primaries and almost black secondaries. I cannot recollect having before seen any species quite so dark in colour. The locality is given as "North America."

Arctia rhoda, Butler.

1881—Butler, Ent. Mo. Mag. xviii., 135.

Arctia ochreata, Butler.

1881.—Butler, Ent. Mo. Mag. xviii., 135.

The types of the above species are usual forms of *nais*, Dru., easily matched in any good series of specimens. The term *ochreata* applies to the common yellow form. These references are made in my list from the descriptions, and are now justified by the comparison of the types.

Arctia radians, Wlk.

1856—Wlk., Cat. Lep. Brit. Mus., Het. iii., 632, *Apantesis*.

The type is that form of *decorata*, Saunders, in which the primaries are almost immaculate, the pale colour reduced to a forked line on the median vein. If this form is distinct from *nais* Walker's name has priority, Mr. Saunders's species having been described in 1863.

Arctia dodgei, Butler.

1881—Butler, Ent. Mo. Mag. xviii., 135.

This is a poor specimen of *phyllira*, unworthy of even varietal rank. Mr. Butler suggested that this might be the Mexican representative of *phyllira*, though the specimen bore no locality label; but it is Drury's species itself, and not a representative of it.

Antarctia walsinghami, Butler.

1881—Butler, Ann. and Mag. N. H. ser. 5, viii., 311.

This is a strongly marked, deeply tinted *rubra*, perhaps worthy a varietal rank. The Museum specimen of *rubra* is almost as far from the normal type in one direction as the type of *walsinghami* is in another.

Acherdoa, Wlk.

1865—Walk., Cat. Lep. Brit. Mus., Het. xxxii., 451.

A. ferraria, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 452.

This is the *Varina ornata* of Mr. Neumoegen, Papilio iv., 94.

Among the Abbot drawings in the Museum is an excellent figure of this species, noted as "Taken 27th March flying at night in a swamp near Savannah River. The only one I have met with." It is probable, from the close correspondence of the figure with the Walker type, that the latter is the original of the drawing. According to Mr. Kirby some of the Abbot specimens are in the British Museum, and doubtless this is one of them.

Bellura gortynoides, Wlk.

Described as an ally of *Datana*, but is a noctuid, and is an earlier name for *Arsama densa*, the generic term also being earlier than *Arsama*.

Hatuna semirufescens, Wlk.

1865—Wlk., Cat. Lep. Brit. Mus., Het. xxxii., 450.

This is *Schizura unicornis*, A. & S. In the Trans. Am. Ent. Soc., ii., 86, Messrs. Grote and Robinson cite *Edema semirufescens*, Wlk., xxxii., 424, to *unicornis*, and this species with the same specific, but other generic designation is referable to the same form.

Psaphidia resumens, Wlk., placed near *Edema*, is a noctuid, and is *Dicopis viridescens*, Wlk., = *D. muralis*, Grt.

Edema ? transversata, Wlk.

1865—Wlk., Cat Lep. Brit. Mus, Het. xxxii., 427.

This is the same as *Ellida gelida*, Grt. In the Trans. Am. Ent.

Soc. ii., 86, Messrs. Grote and Robinson make this Walker species a synonym of *Janassa lignicolor*; but this is an error. The species is a very well marked one and not easily mistakeable for any other. It must be known in future as *Ellida transversata* and the specific name is not entirely inappropriate if the maculation be used as guide.

Heterocampa semiplaga, Wlk.

1861—Wlk., Can. Nat. and Geol. vi., 37.

This is *Heterocampa pulverea*, G. & R., Trans. Am. Ent. Soc. i., 185, pl. iv., f. 32.

The type of this species is in the collection of the Entomological Society of Ontario, part of the D'Urban material determined by Walker. In the 9th volume of the CANADIAN ENTOMOLOGIST Mr. Grote gives some notes on a number of the species named by Mr. Walker, but he seems not to have had all of Walker's papers, as he omits all reference to the species described in the one above cited. To the courtesy of Mr. J. Alston Moffat I owe an opportunity of examining these omitted species, and the above is one of them; the others are noctuids, to be elsewhere commented on.

Cossus basalis, Wlk.

Mr. Henry Edwards has published the synonymy of this species, and I desire here to merely call attention to the fact that the specimen described by Walker is figured by Abbot, who took it "19 August in oak woods." The synonymy is given under No. 1434, in my List of Lepidoptera.

Zeuzera pyrina, Linn.

Walker gives North America as a locality for this insect. This would be interesting if true, and would prove that the insect is not a comparatively recent importation as has been supposed. I have not been able to find anything either in the British Museum collection or in the records to warrant Walker's citation, and I am not willing to accept it as evidence without some decided support.

The above comprise all the notes made by me on the earlier series of Heterocera. The time at my disposal was limited, and it would require three or four days work at least to look over the material carefully. It is more than likely that some of the species which I did not see have been removed to other series where I did not keep a lookout for them. A few at least of the names are disposed of here.

CANADIAN GALLS AND THEIR OCCUPANTS—EUROSTA SOLIDAGINIS, FITCH.

BY WM. BRODIE, TORONTO.

"Attacking the Solidago or Golden Rod." "Quite common in eastern New York." "Slender, straight, smooth stalks of the Golden Rod quite often have one and sometimes two large, round galls or ball-like swellings upon them, an inch in diameter, when the stalk above and below is less than a quarter of an inch." "In the winter season most of them are found to be empty, with a round hole perforated in them, the worm having completed its growth, and the winged fly having come out through this perforation the preceding autumn. But occasionally one of these balls is found at this season without any hole in it. In these the worm is still remaining to complete its changes and continue its species the coming summer." Fitch, 1st N. Y. Report, 1855.

Galls spherical, from 15–30mm. in diameter. Average of 50 specimens 23 mm.; on stems and panicle branchlets of Solidago, sp. ?; outside of gall hard and smooth; colour pale straw; interior uniform white, spongy, dense; larva occupying a small, irregular, nearly central space; from 1–10 galls on a plant, usually 2–3.

"This fly measures from 0.35 to 0.40 inch to the tip of the wings. Its body is of a pale brownish-yellow or a tawny whitish colour with two darker brown stripes above upon the thorax. The antennæ, mouth and legs are dull yellow, the face white, and the top of the head yellowish-brown, with a blackish spot at base where the three ocelli or simple eyes are situated. The wings are tawny brownish-yellow, with blackish clouds, and with several dots and veins of a lighter yellow. On the outer margin beyond the middle are two small triangular hyaline spots, and a third longer one inside of these. A large transverse hyaline spot on the apex and two large triangular ones upon the inner margin, the inner one being larger and prolonged upon the margin of the base. Upon the margin of the wing, in these large hyaline spots are some tawny yellowish dots or small spots, namely, three in the apical spot, one in the small triangular one, one or two in the larger triangular one, and three where this last spot is prolonged in the axilla." Fitch, 1st N. Y. Report, 1855.

"Brownish-ferrugineous with the head and legs more yellow; front very broad; scutellum very convex, with two bristles. Wings reticulated with fuscous having one limpid space at the costa and two at the posterior

border scarcely dotted with fuscous. Long. corp. 0.26. Long. al. 0.26 inch." Loew. Mon. Dip. N.-A. Vol. I. p. 82.

I received a collection of these galls made at Carberry, Manitoba, by W. G. A. Brodie in Nov. '82, from the upper part of the stems and branches of a species of Solidago very common on the open prairie. These galls were unusually large, measuring 27–30 mm. in diameter. The producers, *Eurosta solidaginis*, Fitch, began to come out at Toronto May 2, '83, and parasites, *Eurytoma gigantea*, Walsh, a few days later, and also a parasite beetle bred from an *Eurosta* pupa case and identified by Dr. Hamilton, of Allegheny, Pa., as *Mordellistena nigricans*, Melsh. A collection of these galls made at Crowfoot Crossing, N. W. T., by W. A. Ducker, D. L. S., Nov. '83, reached Toronto Dec. 25, '83, gave producers and parasites May 22, '84. A collection made 50 miles north of Crowfoot Crossing, N. W. T., by W. A. Ducker, D. L. S., Dec. '83, producers, *E. solidaginis*, Fitch., came out at Toronto May 25, '84–May 29, '84; parasites, *E. gigantea*, Walsh, May 27, '84–May 31, '84; also three specimens parasitic beetle. A collection made 50 miles south of Crowfoot Crossing, N. W. T., by W. A. Ducker, D. L. S., Dec. '83, gave at Toronto the usual proportion of producers and parasites, *E. gigantea*, Walsh, but the parasitic beetles were numerous. A collection of 87 galls made at Oak River, Manitoba, by Mr. Harry Leigh, in the fall of '84, gave 50 specimens *E. gigantea*, Walsh, at Toronto, June 1, '85–June 6, '85. No producers nor beetles. A collection made at several points between Clearwater, N. W. T., and Portage la Prairie, Manitoba, by W. A. Ducker, D. L. S., in August, '87, arrived at Toronto during Industrial Exhibition, '87, gave producers June 4, '88–June 10, '88, and parasites a few days later. The lot consisted of 183 galls and gave 83 producers, 38 specimens of *E. gigantea* and 7 beetles.

I have had over 500 specimens of this gall from Manitoba and the Northwest provinces, and I think it very certain that none of the occupants come out in the fall season. I never found more than one occupant in a gall, producer or parasite. The larva makes no preparation for leaving the gall, the exit is made invariably by the imago after leaving the pupa case. The boring is done with the front, and it is very interesting to see the soft, flabby looking mass assume the shape of tools, square and triangular brotches, gouges, chisels and lancet-like points, and surprising to see how rapidly the hard shell of the gall is cut away. This gall seems to have a wide range over the Northwest provinces. In addition to the

localities already given I have evidence of its occurrence at Turtle Mountain, Pelly, Edmonton, Regina, Prince Albert, and Calgary.

This gall is not found in the vicinity of Toronto nor in the adjacent counties; but I am informed by Mr. Jas. Fletcher, Dominion Entomologist, that it is more or less common in the Ottawa region.

In May '84, I liberated ten pairs of *E. solidaginis*, in an untilled field, densly grown up with Solidagos, north of the city, but found no galls afterwards. In June '88 I liberated six pairs in a field east of the city, but no galls have been found.

Dr. Fitch gives the habitat "New York," and Osten-Saken, "Washington" (D. C.) There can be little doubt of the parasitic habit of the *M. nigricans* larvæ. None of the galls gave both beetle and fly; the cells in the galls which gave beetles were similar to those which gave flies, and in all the galls examined—out of which came beetles—there were found fragments of *Eurosta* larvæ or pupæ.

The *M. nigricans* larvæ are most probably external feeders.

It is very desirable that some observer should take up this investigation, and from a careful examination of the immature galls determine the relation between the beetle and the fly.

A NEW DASYLOPHIA FROM FLORIDA.

BY ANNIE TRUMBULL SLOSSON, NEW YORK CITY.

Dasylophia puntagorda, n. sp.

♂.—Head and thorax appearing palest gray from admixture of pure white with cinereous. Abdomen, secondaries and ground colour of primaries sordid white. Primaries streaked longitudinally with blackish, which contrasts violently with ground colour. A diffuse, heavy, blackish shade runs obliquely from apex inward. A curved blackish line, reaching neither costa nor internal margin at outer three-fourths of wing. Submarginal row of distinct, blackish spots, two of which are much larger than the rest and margined with white. Costa interrupted near apex by white spots. Fringe sordid white, interrupted by blackish. Somewhat smaller than *D. anguina*, S. & A., and differing markedly from that species in its sharp contrasts of colour, which make it appear like a purely black and white insect. It has no ochreous shade. The antennæ resemble those of *D. anguina*, the pectinations not as long as in those of *D. interna*, Packard. Described from two males taken at light. Punta Gorda, Florida.

EARLY STAGES OF INDIAN BUTTERFLIES.

A new contribution to our knowledge of the *early stages of butterflies* has come *from Bombay*, where Messrs. Davidson and Aitken have published (Journ. Bomb. Nat. His. Soc., Vol. 5,) half a dozen coloured plates, excellently drawn by Mrs. Blathwayt, representing the transformations of sixteen species. Their published notes, however, cover no less than 94 species and run through all the families, and among them will be found many interesting things,—a chrysalis of Elymnias "suspended by the tail only, but in a rigidly horizontal position," a species of Abisara, one of the Lemoniinæ, whose larva has the head free, a gregarious Delias where the eggs are laid "in parallel rows with equal intervals," a Papilio laying, like our species of Polygonia, ten eggs in a column, Hesperidæ with fluffy secretions, and some where the transformations are open, and which in some cases have and in some have not a median girth. When we find this as the result of two seasons' work, and most of it of one, we can but wish long life to the authors. Seventy species of butterflies were reared the first year.

The course of insect life in India is so different from that with which we are familiar, and yet has so many points of contact, that it is worth while to transfer the following passage to our columns :—"In the case of a great many, perhaps the majority, of species, larvæ are found plentifully in June or July, that is, a short time after the monsoon bursts and vegetation starts into growth. These become pupæ, and for a time not a larva is to be seen ; then the butterflies of that brood emerge and lay their eggs and larvæ begin to appear again, but this time they continue for two or three months, in some cases until the end of the year. Then they cease and the butterflies also disappear, but a number of pupæ, and perhaps eggs, remain, to start into life when conditions are again favourable, which will be in March if the food-plant sprouts then, otherwise in June. Of these dormant pupæ a few come out at odd times, but the butterflies thus sent into the world out of season doubtless perish without offspring. This seems to be something like the order of events with many of the common species of Papilio, the Danainæ, the Junonias, and others ; but there are many species which do not follow this rule, and some seem to have only one short season in the year."

DESCRIPTION OF FOUR INSECT MONSTROSITIES.

BY H. F. WICKHAM, IOWA CITY, IOWA.

The following cases of insect monstrosities have come under my notice, and I have thought it best to make them known in order that those interested in this work might have access to the descriptions. While but little seems to have been written on the subject in this country beyond the describing of a number of interesting forms by Jayne (Trans. Am. Ent. Soc., VIII.) and Henshaw, Scudder and Hagen (Psyche), it has attracted considerable attention in Europe, many writers having published accounts, with figures, of more or less interesting cases. With this prelude I offer the following descriptions and figures. All the specimens are in my own cabinet, deposited in the Museum of the State University of Iowa:—

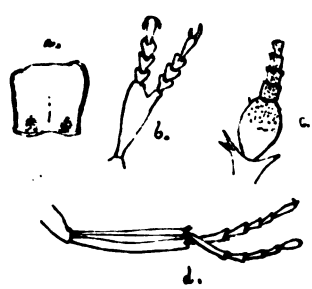

Fig. *a* represents the thorax of a specimen of *Pterostichus validus*, Dej., in which the left side is much shorter than the right. There is nothing in its appearance that would indicate this malformation to be the result of an injury to the pupa, so it has been considered worth while to let this case go on record.

In fig. *b* is shown a rather curious though not particularly uncommon structure. It is the right anterior leg of a specimen of *Trichodes nuttalli*, taken at Iowa City in July, 1885. Here the tibia is somewhat stouter than normal, and from near the tip on the outer surface springs a branch, as shown in the cut, having a tarsus which, except for being a little slender, is almost identical with the other. The claws on this supplementary tarsus are, however, not well formed. Aside from this leg the specimen shows no departure from the average individuals of the species.

A curious monstrosity is seen in a specimen of *Polyphylla hammondi*, Lec., which I have tried to reproduce in fig. *c*. Here the right middle tibia (which is just perceptibly more slender than the normal left one) bears a five-jointed tarsus of the remarkable form shown. The first joint is sub-pyriform in shape, the smaller end articulating with the tibia; the remaining joints are smaller, and decrease regularly in width, also slightly in length excepting the last; there are no claws. The large basal joint has on the under surface a transverse impressed line running about half

way across it a little before the middle ; the base is smooth for half the length, the remainder with rather large, tolerably close punctures ; near the tip is a small spine, not more than one-third of the usual size. The upper surface is covered with dense, recumbent, somewhat golden pubescence which obscures the sculpture. The remaining joints are all more or less scabrous, the second covered above with pubescence like that of the first, but the third, fourth and fifth only bear a few scattering hairs. The specimen is a male and is one of a number taken by me at Albuquerque, New Mex., in 1888.

The remaining example (fig. *d)* is that presented by a *Macrobasis tenella*, Lec., from Tucson, Arizona. The left middle leg is here affected, the femur having two tibiæ, each having its tarsus. What we may consider as the normal one departs but little, if at all, from the usual type, though it is possibly a little more bent ; the other is more slender, its tarsus weaker, the last tarsal joint being more like that of an antenna than of a leg. The accessory member is less perfectly chitinized than the other. Both tibiæ have the usual spurs at the apex, though they are partially hidden in the figure.

NEW SPECIES OF PHORA.

BY J. M. ALDRICH, BROOKINGS, SOUTH DAKOTA.

The following table includes only the species of *Phora* described by Loew, and four new ones—ten in all. *Phora atra* of European entomologists, together with *P. cornuta*, Bigot, *fuscipes*, Macq., and *rufipes*, Meigen, are said to occur in North America—the second in Cuba, the last two in the Hudson Bay region—but I have not seen the descriptions :

1. Middle tibiæ armed with bristles on the outer side below the knee ; frontal bristles all pointing upward, - - - - - 2
   Middle tibiæ unarmed on the outer side below the knee ; bristles of the lower edge of the front pointing downward, - - - 6
2. Halteres black or blackish, - - - - - - - - 3
   Halteres white or whitish, - - - - - - - - 5
3. Second heavy vein very thick and stout, - *pachyneura*, Lw.
   Second heavy vein not unusually stout, - - - - - 4
4. Second heavy vein simple, the apex dilated, - - *clavata*, Lw.
   Second heavy vein forked, - - - - *cimbicis*, n. sp.

5. Hind tibiæ armed with two bristles below the knee, - *luggeri*, n. sp.
   Hind tibiæ armed with one small bristle below the knee,
   - - - - - - - - - - - *microcephala*, Lw.
   Hind tibiæ with a row of small bristles down the outer side,
   - - - - - - - - - - - *incisuralis*, Lw.
6. Head yellowish, - - - - - - - - - *scalaris*, Lw.
   Head black or blackish, - - - - - - - - - 7
7. Legs pale yellowish, - - - - - - - - *nigriceps*, Lw.
   Legs brownish or blackish, - - - - - - - - 8
8. The four lower frontal bristles strongly convergent, - *minuta*, n. sp.
   The four lower frontal bristles parallel, - - - *setacea*, n. sp.

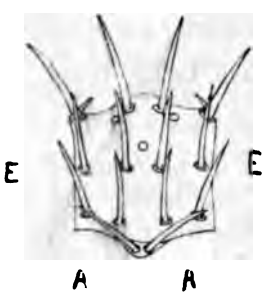

FIG. 1.
Phora cimbicis, female.
A.A. antennæ, E.E. eyes.

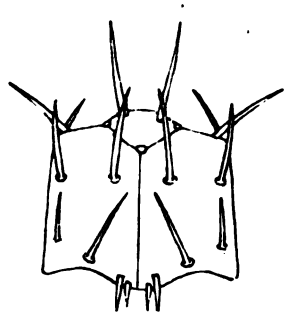

FIG. 2.
Front of Phora setacea, female.

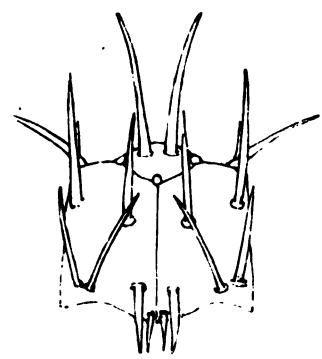

FIG. 3.
Front of Phora setacea, male.

Phora cimbicis, n. sp.

Head black, front broad, nearly square, comprising about half of the width of the head, below with an obtuse prolongation in the middle; no ocellar prominence; at the extreme lower edge of the front in the middle, are two bristles, directed upward and strongly outward. A few minute hairs, arising from coarse punctures, lean toward the middle line of the front. Antennæ brownish black. Palpi longer than antennæ, of the same colour, oblong, at the tip with about six stiff, short bristles. Proboscis short, stout, yellow. Dorsum of thorax black, the humeri distinctly separated; beginning at their posterior corners, a row of small bristles borders the dorsum. In all my specimens the region of the scutellum is injured by the pin; there is a longer bristle, however, on the dorsum, at the corner of the scutellum, and the latter is bristled behind. Pleuræ

black, a little shining; a group of two or three bristles just below the prothoracic spiracle, and a pair at the base of the forecoxæ. Abdomen wholly satiny black like thoracic dorsum, except the first segment, which is whitish above in the middle; the last joint longer than the preceding. Halteres black, the pedicel a little yellowish at base. Fore and hind tibiæ with one, middle tibiæ with two, bristles on the outer side a little below the knee; the hind tibiæ have also a scattering row of three smaller ones, running down to the tip; the tips of middle and hind tibiæ armed with long spurs. The legs are wholly satiny brownish-black, except that the front ones are from the coxæ gradually lighter, ending in brownish-yellow tarsi, and that the middle tarsi, and sometimes the tibiæ, are also brownish yellow. Wings subhyaline; the second heavy vein is forked; the first light vein is nearly straight, and ends a little before the apex.

Length of body, 3 mm.; of wing, 2 mm.

Brookings, South Dakota.

Three female specimens, reared from *Cimbex americana*, Leach. Dates of emerging, May 24, 26, 27.

Phora setacea, n. sp.

♀. Head black, front very wide, at the middle of the lower border with two pairs of small bristles pointing downward, the smaller pair difficult to make out. Ocellar tubercle bounded by a suture which extends as a delicate line down the front. Antennæ fuscous. Palpi yellow, with black bristles. Proboscis yellow. Thorax black, with a few scattered bristles along the dorsal margin. Abdomen black, tapering, the last segment cylindrical, more or less retracted, the extremity yellow. Halteres very light yellow. Front and middle legs yellow, the hind ones more brownish. One spur at the apex of the tibia, except in the front legs, where there are none. Wings hyaline, the second heavy vein forked, the first light vein nearly straight, rather long bristles on costal border to end of second heavy vein.

♂. General colour same as ♀, but the bristles everywhere noticeably longer. On the lower edge of the front both pairs are quite prominent, leaning down but little. The coxæ have a few bristles on the outer and apical portions; the posterior coxæ have a conical protuberance on the hind side. The genitalia are exserted, lying close up under the back part of the abdomen. They consist of some shriveled clasping organs, the structure being unrecognizable. They arise apparently from the next to the last segment, leaving the last one projecting downward and backward

from their base. The bristles upon the costal margin of the wing are unusually long.

Length of body, 1.2 mm.; of wing, 1 mm.

Brookings, South Dakota.

Four ♀ and one ♂ specimen, reared from *Cimbex americana*, Leach. Dates of emerging, June 1, 2 and 8.

Phora luggeri, n. sp.

Head brownish black, front very broad, at the lower border with two small, widely divergent bristles arising a little below the edge of the front. Antennæ and palpi brownish-yellow, the former with a yellow bristle, the latter with stiff black ones. Thorax brownish-black, with few and small bristles. Abdomen more or less yellowish at base above, the remainder brownish-black, the seventh segment long and tapering. Wings hyaline, the heavy veins yellow, the second hairy on the upper side to the point of division, which is near the end, the two branches so little divergent as hardly to be made out with a simple lens. First light vein strongly bowed at base, straight for the remaining two-thirds of its course, ending at the apex. Halteres wholly yellow. Legs wholly yellow; the front tibiæ with a bristle on the outer side below the knee, the middle and hind tibiæ with two each in the same situation. Middle and hind tibiæ with spurs at apex.

Length of body, 2.2 to 2.6 mm.; of wing, 2.5 to 3 mm.

Two female specimens from St. Paul, Minn. (Lugger).

In the other three new species the second heavy vein is bare, except a single fine bristle near its base.

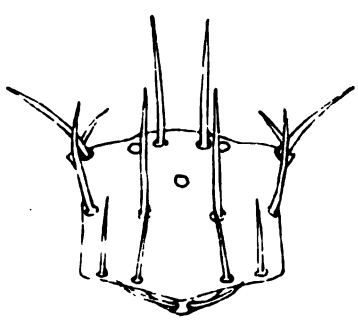

FIG. 4.
Front of Phora luggeri, female.

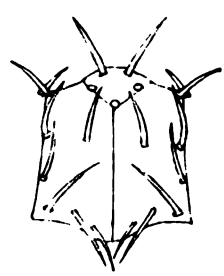

FIG. 5.
Front of Phora minuta, female.

Phora minuta, n. sp.

Head black the front broad, convex, with a few minute hairs slanting towards the middle line; the usual bristles rather small, arranged as shown in figure. Ocellar prominence defined by a very fine impressed line, which continues down the front. Antennæ brownish-black. Palpi brownish, with a few black bristles at tip. Proboscis small, yellow. Thorax uniformly black, with but few bristles. Abdomen black, tapering, the last segment slender and cylindrical. Halteres light yellow. Wings a little infuscated, except toward the posterior border. Second heavy vein forked near the end. Light veins four in number, the first nearly straight; costal margin with fine bristles to the end of the second heavy vein. Front legs yellow at the coxæ, gradually browner toward the tarsi, without any conspicuous bristles. Middle legs brown, one long spur at the apex of each tibia. Hind legs black, apex of each tibia with one long spur; about seven short bristles form a row down the back side of the apical half of the tibiæ.

Length of body, 1.2 mm; of wing, 1.3 mm. Brookings, South Dakota.

One ♀ specimen, reared from *Cimbex americana*, Leach. Date of emergence, June 1.

In preparing these descriptions I have been unable to make much use of the characters of the dorsum of the thorax, because this region is injured by the pin in most of my specimens. The smaller points of structure were determined with a compound microscope, mostly at 60 diameters, but occasionally with a higher power in the smaller species.

The accompanying sketches, though somewhat rough, will serve to show the number and arrangement of the frontal bristles. Frontal sutures, where present, are also shown. No attempt was made to draw to a uniform scale; and, as the point of view was necessarily not quite the same in all cases, the outlines given are not to be relied upon for the comparative shape of the fronts.

I shall be glad to receive specimens of Phoridæ from any North American locality, and will try to return any favours of this kind. As the species are all very small, the best method of mounting is as follows:— Cut a piece of cork (or pith) ⅛ inch square and ¼ inch long; near one end of this run through a No. 00 Klaeger pin till it projects nearly ¼ inch; cut off the head end close to the cork (with scissors, most conveniently); lay the little fly on its back on a smooth surface, and using a lens if necessary, introduce the point of the pin into its body between the middle legs until it has just reached the dorsal surface; then stick a stouter pin through the other end of the cork in the opposite direction from the first one, far enough so that about half will project below.

THE MOLE CRICKET—GRYLLOTALPA BOREALIS.

BY E. W. DORAN, COLLEGE PARK, MD.

In the January CANADIAN ENTOMOLOGIST Mr. James Fletcher had an interesting article on his "pet" mole cricket. At his suggestion I send a few notes upon the larval form of the same species.

On January 4 last, Mr. A. I. Hayward, connected with our State Experiment Station, brought me five larvæ of the mole cricket, which were found in rather a peculiar situation. He had a number of men putting up ice. The ice had been removed from a considerable space, when, wading around in the water with tall rubber boots on, he found the young mole crickets swimming around upon the water. It seems there was no connection between the open space and the land; besides, as the weather was very cold, they could not live upon or near the surface of the ground.

The only reasonable theory in regard to the matter is that they were buried in the mud at the bottom of the pond, which is a temporary one, having been flooded with water only a month or two. The wading through the mud dislodged them, when they at once came to the surface. However, there are some difficulties in the way of accepting this hypothesis. For example: Could the crickets exist beneath the water in the soft mud so near the surface for so long a time? Westwood says in regard to the European mole cricket, *G. vulgaris*, that the villose coating of the body and wings appears to protect them from the water. Our species has a similar coating of fine hairs; but in the larvæ especially it seems scarcely sufficient to protect it from the effects of the water in a prolonged submersion. Besides, could it live so long entirely surrounded by water, cut off from the air? They must have been in the thin mud very near the water to have been thus stirred out.

They seemed very little affected by the cold or their bath; in fact, they were as "lively as a cricket," and were apparently very much at home upon the water.

The life history of our American species, *G. borealis*, seems not to have been studied extensively. At any rate I have been unable to find figures or descriptions of the preparatory stages. It is stated that *G. vulgaris* requires three years to come to maturity, and *borealis* seems of very slow growth. When these specimens were taken they were but little more than half an inch in length. They are at this time (March 15) about .7 inch long. In two and a-half months they have increased in length but little over one-tenth of an inch, though they have been kept in

a warm room and supplied with plenty of food, consisting chiefly of the roots of growing wheat, earthworms, etc. As the female deposits her eggs in early spring, they are probably nine or ten months old now. The mature insect is an inch and a-half long, while these are but little more than a third as long. Westwood says that *vulgaris* is inactive in winter. These have been active at all times; that is, not in any sense torpid, nor were they when taken.

When I first secured them I put them in a jar of earth, and gave them no further attention for several days. In the meantime one disappeared, and probably served to satiate the appetite of the rest, as they are known to devour their own kind sometimes when they can obtain no other food.

Since then, in exhibiting another before my class, it was accidentally injured and died. I shall try to rear the remaining three to maturity, and figure the various stages. I cannot say what stages they have already passed through. The larvæ of *vulgaris* are white before the first moult. These were dark velvety, and had moulted once or twice, I suppose. They have not moulted since.

I have written these notes in the hope of calling out other observations upon the early stages of the insect. And I should be glad to know of any one who has studied or figured the preparatory stages.

FOURTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

In accordance with an action of the Association, taken at the Washington meeting, the Fourth Annual Meeting will be held at Rochester, New York, two days prior to the meeting of the American Association for the Advancement of Science.

All members intending to present papers are requested to forward titles to the undersigned before August 1st, in order that the programme may be prepared in proper season.

The proceedings of our meetings are attracting the attention of working entomologists of other countries, and it is to be hoped that members will spare no efforts to make the coming meeting even better than those which have preceded it. Owing to the continued ill-health of President Lintner, and in order to relieve him of as much labour as possible, all correspondence, unless of a nature necessitating his attention, may be addressed to the Secretary.

F. M. Webster,
Secretary, Association of
Economic Entomologists.

Columbus, Ohio, May 10, 1892.

NEW NORTH AMERICAN SPECIES OF GORYTES.

BY WM. J. FOX, PHILADELPHIA.

The monograph of this genus, published by Handlirsch,* necessitated the working-up of the unidentified species in the collection of the American Entomological Society. This author has merged several genera into *Gorytes*, viz., *Euspongus*, *Hoplisus*, etc. I have followed him, as several of the species described herein belong to what was once the genus *Hoplisus*. There are several other new species contained in the Society's collection, represented by single specimens only. The following table will separate the species described herein :—

First abdominal segment not petioliform, nor coarctate.

Inner eye-margins almost parallel ; antennæ entirely yellowish. *tricolor*, Cr. ♀

Inner eye-margins distinctly converging towards the clypeus.

Flagellum long and slender, not or scarcely thickened towards the apex ; markings yellow.

Posterior face of metathorax not rugulose. *nevadensis* ♀ ♂

Posterior face of metathorax strongly rugulose. *atrifrons* ♀ ♂

Flagellum distinctly thickened towards the apex ; markings whitish. *albosignatus* ♀ ♂

First abdominal segment petioliform ; joint 10 of the antennæ incised beneath. *mirandus* ♂

First abdominal segment coarctate ; black, with the second abdominal segment red. *rufocinctus* ♀

GORYTES TRICOLOR, Cr.

G. tricolor, Cr., Trans. Am. Ent. Soc., I., p. 380, ♂, (non ♀).

♀.—Head not as broad as the thorax ; ocellar region rather distinctly raised, the ocelli forming a curve ; frontal furrow well marked ; clypeus with large, sparse punctures, convex, transversly-ovate, the fore margin a little incurved ; eyes almost parallel within ; front, vertex and occiput with strong, separated, punctures ; the cheeks smooth ; flagellum but little thickened towards the apex ; scape much longer than the clypeus is wide medially ; third antennal joint but little longer than the fourth, joints 4-6 about equal, the fourth if anything a little longer than the

*S. B. Akad, Wien, XCVII., Heft. 6 & 7, pp. 316-562, pls. 1-3, 1888.

fifth. Thorax with very strong separated punctures, those on the scutellum very sparse ; basal triangular space of metathorax well marked, divided medially by a furrow, almost smooth (some specimens show traces of longitudinal and others transverse striæ); four posterior tibiæ and tarsi strongly spinose ; the anterior tibiæ strongly ciliated ; spur of anterior tibiæ obliquely truncate ; wings hyaline, a fuscous cloud covers the marginal, upper portion of third submarginal, the second submarginal and parts of the first, second and third discoidal cells ; stigma and costal nervure yellowish ; transverse medial and the cubital nervures of the hindwing interstitial. Abdomen with strong, separated punctures beneath the middle of the second and the basal half of the third and fourth segments, impunctate ; pygidium short and broad, the lateral carinæ or margines not extending to the base of the segment. Black ; a broad elongate mark on the cheeks, prothorax, dorsulum and mesopleuræ in part, the metathorax, except enclosed space at base and a somewhat similarly shaped mark on the posterior face, the legs, variegated with yellow, the first abdominal segment above, except apical margin, and the last two segments, all rufous ; face, clypeus, basal half of mandibles, antennæ, prothorax above, a large blotch on the mesopleura anteriorly, scutellum and a broad band on apical margin of segments 1–4 above, and on segments two and three beneath, all yellow ; the antennæ slightly inclining to brownish. Length, 10–11 mm.

Var.—One specimen from Colorado, instead of being black, is entirely rufous, but with the same yellow ornamentation.

Montana and Col.

GORYTES NEVADENSIS.

♀.—Head as broad as the thorax ; ocellar region rather distinctly raised ; ocelli forming a low triangle ; frontal furrow distinct, but not strong ; eyes distinctly converging towards the clypeus ; clypeus convex, with large, scattered punctures, the anterior margin a little incurved ; scape of antennæ not as long as the width of the clypeus medially, the flagellum long, not thickened ; third antennal joint about one-third longer than the fourth ; front strongly punctured, the occiput finely and sparsely so. Dorsulum with sparse, large punctures, with four impressed, parallel lines basally, which do not extend beyond the middle ; mesopleuræ with exceedingly fine punctures ; suture between dorsulum and scutellum foveolate ; enclosed space of metathorax strongly sulcate medially, with 9–10 strong radiating striæ on each side of the sulcus, the striations

extending slightly over the margin of the enclosure; the posterior face is divided by a very strong sulcus, which begins at the apex of the basal enclosure; with the exception of a few coarse rugæ at the apex the posterior face is smooth, or with exceedingly fine punctures; the meta-thoracic stigmas are covered by a strong, somewhat flat-like production; wings sub-hyaline, with a yellowish tinge, the marginal, a part of the three submarginal cells fuscous, the veins enclosing the marginal, second and third submarginal and the outer vein of the third discoidal cells are black, the rest yellowish; transverse medial vein received by the externo medial nervure before the apex of the submedian cell of the hindwings; legs stout, the four hind tibiæ sparsely spinose; anterior tarsi distinctly ciliated, the bristles sparse and short, about half as long as the first joint. Abdomen glabrous, beneath with a few scattered punctures. Black; scape beneath, manibles medially, prothorax above, tubercles, two spots on mesopleuræ, broad line on scutellum, post-scutellum, two large ovate spots on the metathorax, femora beneath, except base, the base of tibiæ, the posterior coxæ beneath and the apical margins of abdominal segments 1–5 above, those on segments one and two emarginate in the middle, the base of the last segment laterally, beneath the apical half of the second, the third fourth and fifth entirely, all yellowish; tegulæ, tibiæ beneath and the tarsi more or less brownish. Length, 12 mm.

♂.—Differs from the ♀ as follows: Frontal furrow indistinct; the four anterior tibiæ and tarsi entirely yellowish; all the coxæ spotted with yellow beneath and ventral segments of the abdomen 3–5 not entirely yellowish; the third antennal joint about one-fifth longer than the following one.

Nevada. Two specimens.

GORYTES ATRIFRONS.

♀.—Resembles *nevadensis* very much, but differs as follows: Front finely and closely punctured; third antennal joint about one-fourth longer than the fourth; labrum ciliated with silvery hairs; metathorax posteriorly strongly rugulose; the first joint of the anterior tarsi is about equal in length to the three following ones united, whereas in *nevadensis* it is longer than the three following joints; the bristles with which the joints are ciliated are more than half as long as the first joint; the yellow bands of the abdomen are narrower, and the pygidium is larger; the scape and joints 3-8, beneath, brownish; the legs are yellow in a greater extent than

in *nevadensis;* the head has, in addition to some spare pale hairs, which are prominent on the clypeus, a brownish-sericeous pile. Length, 10-12 mm.

♂.—Flagellum longer and more graceful than in the ♀, not brownish, the third joint a little longer than the fourth; clypeus, labrum, face, inner orbits broadly, scape and following joint beneath, yellow. Length, 10 mm.

Nevada. Four females and one male. Two of the females have the metathorax destitute of the yellow spots.

GORYTES ALBOSIGNATUS.

♀.—Similar to *atrifrons*, but is at once distinguished by the markings being whitish; the flagellum is gradually thickened; the ninth to eleventh antennal joints are not much longer than broad, the third joint about one-third longer than the fourth; the posterior face of metathorax strongly rugulose, having the appearance of being rugged; wings subhyaline, with scarcely a yellowish tinge; abdomen with the two basal segments shining, the remainder with a slight pile and a few indistinct punctures; pygidium short, a little longer than it is broad at the base, with large, scattered punctures; basal portion of clypeus, face, inner orbits—broadest beneath—scape, and following joint beneath, and a spot on the second and third ventral segments laterally, whitish; the apex of the femora tibiæ and tarsi, except the outer side of the two anterior pair, brownish. Length, 10-12 mm.

♂.—Flagellum long, not thickened, the third joint very little longer than the fourth; four anterior tibiæ and tarsi entirely whitish; the clypeus is not strongly punctured, as in the ♀. Length, 8 mm.

Montana. Four females, two males. This and the two preceding are closely allied.

GORYTES MIRANDUS.

♂.—Head a little broader than the thorax; front depressed medially, with strong, separated punctures, the impressed line distinct; eyes scarcely converging towards the clypeus; clypeus convex, rather strongly and sparsely punctured, the anterior margin incurved; flagellum long, thickened medially, but again narrowed to the apex, the third joint much longer than the fourth, the tenth joint excised beneath. Dorsulum and pleuræ with large, scattered punctures; the sutures of the pleuræ with short, strong striæ, or marked by foveæ, being strongest between the meso- and metapleura; scutellum punctured like the dorsulum; basal triangular space of metathorax well marked, strongly furrowed medially, obliquely

striated, at the apex of this space there is a strong pit or excavation ; the posterior face irregularly striated; on the sides punctured, with an oblique, foveolate furrow ; hind tibiæ and tarsi distinctly spinose ; the anterior femora much broadened, flattened or depressed on its inner side on the basal portion ; wings subhyaline, iridescent ; the marginal cell and the apex of the wing, fuscous. Abdomen shining, petiolate—that is, the first segment is much narrower than the second, broader at the apex than at the base, segments 3-5 above and 2-7 beneath with large, scattered punctures, those on the first segment dorsally and ventrally, and on the second segment above, not so distinct ; last ventral segment bifid. Black; clypeus, labrum, mandibles, except apex, face, inner orbits broadly, scape and third antennal joint beneath, the second joint entirely, posterior orbits, anterior margin of collar, prothorax above, tubercles, anterior portion of mesopleuræ, spot beneath tegulæ, an oblique line on the dorsulum by the tegulæ, scutellum, post-scutellum, a large spot on each side of the posterior face of the metathorax, legs, except the upper surface of the coxæ, trochanters and femora, a broad band on apical margins of all the abdominal segments above, the one on second segment broadest, and on the ventral segments, with exception of the base, all yellow ; the greater part of the antennæ and the posterior tibiæ and tarsi, in part, brownish. Length, 9 mm.

Nevada. Four specimens. Related to *notabilis*, Handl., from Mexico, but differs in having the tenth antennal joint excised beneath, etc.

GORYTES RUFOCINCTUS.

♀.—Ocelli placed in a triangle, the posterior pair connected by a curved furrow; clypeus with large punctures, its anterior margin incurved; eyes diverging towards the clypeus ; front having the appearance of being exceedingly finely granulated, the furrow distinct ; antennæ long and slender, the third joint much longer than the fourth. Thorax shining, the dorsulum with exceedingly fine and close punctures; the mesopleuræ with large, shallow, scattered punctures ; sutures between the dorsulum and scutellum, and the scutellum and post-scutellum, distinctly foveolate ; enclosed space on metanotum large, channelled medially and covered with beautiful, radiating striæ ; apical portion of posterior face roughened, the basal portion smooth, shining; wings subhyaline, nervures and stigma black ; a fuscous cloud fills the marginal, second submarginal and part of the third discoidal cells ; transverse medial nervure of hindwing confluent with the cubital nervure ; medial and posterior tibiæ and tarsi distinctly

spinose ; anterior tarsi ciliated with long, white bristles. Abdomen with strong, sparse punctures ; the first segment strongly coarctate, before the apex above, with a deep wide, transverse furrow, which extends from side to side ; ventrally, the punctures are more distinct, especially on the last segment; last segment above strongly and sparsely punctured ; deep black ; shining; the flagellum beneath and the tarsi slightly brownish ; inner side of anterior tibiæ yellowish ; apical margin of the first segment and the second segment, except apical margin, rufous. Length, 10 mm.

One specimen. Washington (State). A very distinct species.

DESCRIPTION OF A NEW ANTHOCHARIS.

BY W. G. WRIGHT, SAN BERNARDINO, CAL.

A. Flora, n. sp.

♂, expanse 1.40–1.75. White. Forewings blackish at base ; many black scales along costa ; bar broad, at costa reaching inwards, and at the middle with an angle outwards into the orange, with a broadening, vaguely-edged stripe connecting it to the margin near inner angle ; orange patch very large, deep reddish coloured, the colour extending to costa and also to outer margin near the angle ; apical margin black with obtuse serrations inside, the lower end becoming maculate or merely of roundish spots in the edge of the orange patch ; fringe white and black.

Secondaries white, seldom faintly tinged with yellow ; base blackish ; eight or nine relatively large black spots at end of nervules ; fringe white with a few black filaments at the venules.

Under side : bar separated by a deep sinus on the outer side into two ovoid spots ; the orange paler, followed by faint pink, then by pale blue ground, with blackish spots along nervures. Secondaries : veins yellow ; a dense marbling of black relieved by scattered yellow scales ; the pattern of marginal marbling is of even-sized spots along the venules, with narrow interspaces white.

♀, expanse 1.40–1.70. Yellow ; orange patch much smaller and a little paler than in the ♂ ; a yellow sexual stripe, sometimes maculate, next to the orange and scarcely separated from it by indefinite cloudy spots ; the apical margin becoming but a series of connected blackish points projecting sharply into the yellow. Hindwings yellow, with marginal spots as in the ♂.

Under side : similar to the ♂, but more deeply yellow.

Habitat, Western Washington.

Described from 55 ♂, 21 ♀.

This is the most northern of the orange tipped group of Anthocharis. It is found from the Willamette Valley in Oregon to Vancouver in British Columbia, and from the Pacific Ocean to the Eastern slopes and spurs of the Cascade Range of mountains in Central Washington, but in Eastern Washington and Idaho it is replaced by *A. stella*. Its metropolis is in the densely fir-forested country west of the Cascades, and about Puget Sound, where it is fairly abundant. The ♂ is a little larger than *A. reakertii*, and with broader wings and more pronounced black markings; and the marginal marbling in even blocks along the venules is distinct. The ♀ is deep lemon yellow, the colour being even and uniform rather than discal. This species is also rather peculiar in that the ♀ is of smaller average expanse than the ♂.

CORRESPONDENCE.

CATOCALA AMICA, HUBN.

Dear Sir: I notice that Mr. Hulst refers *lineella* as a synonym of this species. It is not a synonym, but a well marked variety, constantly recurring with the typical form. I remember that my earlier opinion that it might be a distinct species was shared by W. H. Edwards, as well as other lepidopterists. On the other hand Mr. Hy. Edwards's *herissa*, referred by me as a variety, Check List, p. 40, is a suffused Southern form of *Amica*, no two specimens being exactly alike (as is the case with *lineella)*, and giving one the impression as if the species had run out in Texas. I do not know if it is found in Mexico. *Lineella* must be restored as a perfectly recognizable variety of *Amica*. I embrace this occasion to repeat my opinion that *Alabamæ* is a valid species, as also to protest against the identification of *fratercula*, G. & R., with *micronympha*, Guen. I believe also that when *residua* and *Meskei* come to be bred, their specific validity will abundantly appear. I have had to rescue *praeclara*, *dulciala*, *crataegi*, and other species from Mr. Hulst's errors in cabinet opinion. It is not necessary for me to lose one word over Mr. Hulst's rejection of *Euparthenos* and *Audrewsia* as valid genera.

Very respectfully,

A. R. GROTE.

A CORRECTION.

Dear Sir: In my paper on "New North American Homoptera," in the May number of the CANADIAN ENTOMOLOGIST, on page 115 occurs a typographical error that calls for a prompt correction. The name *Athysanus obtusus* there applied to a species described as new should have read OBTUTUS. The name *obtusus* was long ago preoccupied for a well-known European species in this large genus. The similarity of these names is only in their form, and need not be confusing.

Buffalo, N. Y., April 29th, 1892. EDWARD P. VAN DUZEE.

BOOK NOTICE.

SPECIAL REPORT OF THE STATE BOARD OF AGRICULTURE on the work of Extermination of the Ocneria Dispar, or Gypsy Moth. Boston: Wright & Potter Printing Co., 1892.

This official pamphlet gives an interesting account of the very remarkable and unique efforts that are being made in the State of Massachusetts to exterminate the Gypsy Moth. This insect, imported from Europe, was accidentally permitted to establish itself about twenty years ago, and has now multiplied to such an extent as to be a very serious pest throughout a considerable area of the State. In March, 1890, the Legislature passed an Act appointing three commissioners to "provide and carry into execution all possible and reasonable measures to prevent the spreading and secure the extermination of the *Ocneri dispar* or Gypsy Moth in the commonwealth". The sum of $25,000 was also appropriated for the work. Last year the commission was merged into the State Board of Agriculture, and a further grant of $50,000 was made to it. The report before us gives the details of the work carried out and the modes adopted for waging war against the insect. They were very largely under the direction of Prof. Fernald, as Entomological Adviser, and Mr. Forbush as Superintendent of field work. The number of men employed varied with the season, and at one time, in June last, was as many as 242. The work began with the destruction of the eggs; when these proceeded to hatch out, spraying the caterpillars with insecticides was adopted, and towards the close of the season the eggs were again made the objects of attack. An enormous number of the insects were thus destroyed and a perceptible diminution in the amount of injury was observed in some places. We shall look forward with great interest to the results of the present year's operations, and hope in time to be able to record a great victory in this field of practical entomology.

Mailed May 30th.

The Canadian Entomologist.

VOL. XXIV. LONDON, JULY, 1892. No. 7.

NOTES ON COLEOPTERA—NO. 10

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Platynus reflexus, Lec., and variety *a*.—This species may be found in some abundance when sought for in its natural habitat: under stones in the bed of nearly dry hill-side streams and the debris along their banks, June being the time of its greatest abundance. In Dr. Leconte's synopsis of *Platynus* (Bull. Brook. Ent. Soc., II.,) a variety is noted as *a*, with four elytral punctures, while *reflexus* has but three—nothing further being stated. This form occurs here, not as an individual variation, but at least as a race, perhaps a species. It is more elongate, narrower and smaller than *reflexus*, the latter being from .44 to .48 inch. in length, while the variety *a* is from .35 to .38 inch.; the head is narrower and longer behind the eyes, and a little longer than the thorax; the thorax is narrower, less rounded on the sides, more gradually narrowed to base and about as long as wide; the base of the elytra is less emarginate, and the humeral angles more obtuse; the general colour is much less piceous. These comparative differences, it will be seen, enable these forms to be separated at sight. The anterior three elytral punctures are usually placed at uniform distances, either in the third stria or on the external side of the third interval, though the third is occasionally placed on the internal side of this interval; the fourth puncture is situated in the second stria about one-fifth from apex—sometimes on inner side of the third stria. There are now before me twelve examples of *reflexus* and twenty of var. *a*. While *reflexus* is liable to turn up in any spring run during the summer, I know of only one locality for var. *a*—that from which the above examples were taken May 4th. This is in the bed of a spring run which is dry all summer except during a rain. Whether this form occurs elsewhere is unknown, and it is probable the examples seen by Dr. Leconte came from here.

Liparocephalus brevipennis, Mæk., Bull. Mosc., 1853, 192.—The examples on which this species as well as genus were founded were taken

on the coast of the Island of Chtagaluk, under sea drift. When Dr. Leconte reviewed the genus (Tr. Am. Ent. Soc., VIII., 177,) there was before him a small male example from Unalaschka, also a male from the coast of Mendocino, Northern California ; and on the latter a species was erected, the two forms being separated thus :—

" Head not wider than the prothorax, which is feebly narrowed behind, and not sinuate on the sides ; basal angles obtuse, rounded, length 2.7 mm. [that of type 2 lin=, 1775 *inch.*]—*brevipennis.*"

" Head wider than the prothorax, which is strongly narrowed behind, with the sides subsinuate near the base ; basal angles rectangular, very slightly rounded ; 3.6 mm.—*cordicollis.*"

There are before me 3 ♂ and 2 ♀ examples of *brevipennis* ; one of the males has the head scarcely as wide as the thorax, another subequal to and a third greatly wider ; in this example the thorax is narrowed to two-thirds at base, with the angles somewhat rectangular ; in the others as well as in the females it is more or less narrowed, with the basal angles varying from obtuse to strongly rounded. The females have the head and thorax subequal and the last ventral segment rounded. In both sexes the dorsum of the thorax is widely arcuate, and more or less deeply concave from the base to the middle. The characters relied upon by Dr. Leconte to establish his species seem to be inherent also in Mæklin's. These examples are from the Queen Charlotte Islands, the fauna of which, judging from the portion of it seen, or lately recorded, appears to be identical with that of the neighboring Alaskan Islands.

Dendrophagus glaber, Lec.—An example of this wide spread northern species occurred here in April of this year, and I saw another taken near the same time in Elk County, Pa.

Brontes dubius, Fab., *truncatus*, Mots., and *debilis*, Lec.—Mr. T. L. Casey (Tr. Am. Ent. Soc., XI., 99) says of *debilis* : " This is the common northern species, while *dubius* is more plentiful at the South." This remark, which is probably a clerical error, is occasioning trouble among a certain class of collectors who have Mr. Casey's paper. The fact seems to be the reverse. While *dubius* is excessively abundant here and northward, *debilis* has not occurred, neither is it on any of the northern catalogues, with one exception, which examples from its author show to be an error. I cite Leconte in Agaz. Lake Sup., No. 61 (Hamilton and Henshaw's Cat.); Harrington, No. 34 ; Brodie and White, No. 12 ;

Hubbard and Schwarz, No. 54; Reinecke (‡ *debilis)*, No. 107; Dury, No. 27,—all the Canada label lists. If Mr. Casey's statement cited is not an error, the localities of its northern distribution are not on record.

B. debilis was described from Georgia, with the remark: "not rare."

B. truncatus, Mots., from Alaska and California, is very easily separated from the other species, and, though catalogued as a variety, seems to be as good a species as *debilis*. The name *truncatus* is sometimes applied to certain individuals of *dubius* in which there is an evident sinuosity at the apex of the elytra, but this is different from that in the true *truncatus*, and other secondary characters are absent.

Rhopalophora longipes, Say, and *R. Meeskei*, Casey, (Ann. w. Y. Acad. Sci. VI., 30.—*R. longipes* occurs here occasionally in June; when found it is in abundance, and twenty-eight examples are before me. There are also before me from St. Fe Canon, N. M., seven examples of what Mr. Casey describes as *R. Meeskei*, but which can scarcely be considered more than a slight geographical variation of *longipes*. Although Mr. Casey states he had before him a good series of *longipes* from Indiana, it could not have been such a miscellaneous lot as is before me or he would scarcely have written the conspectus.

"Prothorax narrow, truncate at base, not impressed dorsally.—*longipes.*"

"Prothorax broader, feebly biimpressed dorsally, broadly, strongly emarginate at base; form more robust.—*Meeskei.*

The twenty-eight examples before me exhibit great instability in length, breadth and sculpture of the thorax; in some of the ♂ ♂ it is fully one-third longer than wide, and in others, both ♂ and ♀, subequal; in the majority of individuals of both sexes however it is evidently longer. As to sculpture, all the individuals have a wide constriction at apex occupying about one-third of the length of the thorax, and more or less evident, which is sometimes interrupted at middle by a dorsal subcarina; the transverse basal impression is narrow, and in all there is an obtuse tubercle on each side behind the middle more or less prominent. Some individuals have a carina between these tubercles extending from near the base to the apical constriction, often continued forward obtusely; on each side of this carina is a broad oblique impression which connects behind the carina with the other and the transverse basal; the tubercles mentioned are situate behind this discal impression and appear more or less elevated according to its depth; the punctuation becomes coarser as

the sculpture of the thorax becomes deeper; the lines of pubescence are too variable to be considered, and the truncation, or emargination of the base of the thorax in a large series is evanescent.

In a systematic point of view the separation of these forms into species seems inadmissible. Remove the locality labels from a mixed lot, sufficiently numerical, and how all could be replaced again with certainty is not evident.

Psenocerus supernotatus, Say, and *P. tristis*, Casey.—This last seems to be the black form of *supernotatus* mentioned (CAN. ENT., XVIII., 113) as found on wild gooseberry *(Ribes Cynosbati)*. In comparing the only example of this form left with Mr. Casey's description (l. c. 46) it seems to apply very fairly; the elytral basal tumidity is, perhaps, a little more pronounced, but this can scarcely be considered essential, as this is quite obsolescent occasionally in examples of *supernotatus*. I once supposed this might be a species, but a study of the variableness of *supernotatus* in connection with the colour changes in *Clytanthus albofasciatus*, *Cyrtophorus verrucosus*, etc., led to a different result.

Sphænothecus suturalis, Lec., and *rubens*, Casey (l. c. 34).—The latter is a form which has been distributed as a variety of *S. suturalis*, being identical in form, size and colour, and chiefly differing by the nature of the thoracic and elytral punctuation. The few examples seen do not connect by intermediate forms, though in a large series, judging from what occurs in some other Cerambycidæ, as *Leptura canadensis*, such may exist. They are easily separable, the most reliable method being to observe the difference of the elytral punctuation. Whether systematists may regard this form as varietal, racial, or truly specific, collectors hereafter can give it a name. My examples are labelled "El Paso, Tex."—*Casey*, Southern Arizona and California. *Suturalis* was described from the Staked Plains, now probably in Lincoln Co., N. M. My examples, Deming, N. M.—*Casey*, Tucson, Arizona.

Leptura serpentina, Casey (l. c. 41), greatly resembles *3-balteata*, Lec., but examples from Idaho exhibit it clearly a valid species, which is readily separable by its rufous antennæ.

Orsodachna atra, Ahrens.—This species has always been perplexing to inexperienced collectors; no other on the list presents more variety in size, sculpture and ornamentation. It varies from .13 to .30 inch in length; the sculpture of the thorax and elytra may be rough and with coarse punctures, or smooth and finely punctate; the colour varies from

entirely piceous black to entirely yellow through all modifications of these colours, the elytra may be vittate, maculate, or unicolorous. A recent study by Dr. George H. Horn gives the first intelligent account of the species as a whole. He mentions six varieties by name separated for convenience by colour characters, though others are not wanting, and there may possibly be two others entitled as validly to the same rank. It is distributed generally from the Atlantic to the Pacific and far northward. Here the species appears in April on wild plum, and later on pear and apple blossoms where the trees are near a wood or forest. Two varieties occur together at this time, neither of which seems to be as mature as the individuals taken later in the season. One of these is the pale or dusky form of *atra*, which is assumed to be the entirely black form with a rough uneven thorax, often with some small, smooth facets. This form is taken sparingly by bush beating as late as August; it is usually coarsely sculptured, and one large example has three evident costal lines on the elytra; all the spring brood of whatever colour with the uneven rough thorax are referred to this variety. The other is the typical *hepatica*, Say, "head black, thorax rufous, elytra brownish." This is as abundant as the brown form of *atra*, and can best be separated from it by the comparative evenness and smoothness of the thorax; later, by beating, an apparently maturer form is taken with the elytra piceous black and the thorax orange-red, named by Newman *ruficollis;* without care this form may be readily overlooked in collecting, from its resemblance to *Corphyra terminalis* with which it frequently occurs. No black example of this variety have been observed.

Of the var. *vittata*, Say, few examples have been seen; the thorax is rougher than in *hepatica*, but less so than in *atra*, is shorter than in either, and entirely rufous; the elytra are piceous with a narrow dorsal stripe, yellow.

The var. *armeniacæ*, Germ., is not common; in it the thorax is entirely piceous black, as rough as in *atra* and more convex, narrower to base and apparently more elongate; the elytra are narrow, piceous, with a uniform moderately wide dorsal vitta yellow. Length, .26 inch. This is a fine variety; none of the others mentioned by Dr. Horn have occurred here.

Of var. *childreni* many examples have been seen from New Mexico, Colorado and Vancouver Island; in general it is less coarsely punctured than the forms mentioned; the colour is perhaps more variable, there

being pale, piceous and vittate forms; from Vancouver I have two examples, one entirely luteous yellow, the other piceous black. An example from New Mexico differs greatly from any of the varieties mentioned by Dr. Horn. The surface of the thorax is entirely smooth, even, polished and shining; convex, sparsely and finely punctured; the elytra are also smooth and shining with a fine but sparse punctuation; the antennæ are ferruginous, and the legs variegated with pale and fuscous. General colour of the insect chocolate-brown. Length, .29 inch. Set beside the *atra* of the same size with semi-costate elytra, it is difficult to believe them to belong to the same species.

Zeugophora consanguinea, Cr.—This is a form of *varians* in which the thorax is entirely rufous. In collecting *varians*, perhaps one example in twenty will be so coloured. I do not know of its occurrence except with *varians*.

Bruchus obsoletus, Say, *B. rufimanus*, Bohm., *B. lentis*, Bohm.—The American history of these unwelcome foreigners has been presented in a very masterly and satisfactory manner by Mr. J. A. Lintner (Seventh Rep. on the Injurious and other Insects of the State of N. Y., 1891). *B. rufimanus*, it appears, is not known to be naturalized, though bred twice, or oftener from peapods or beans brought from Europe, and is the *B. granarius* of Mr. Fletcher's Report (1888). *B. lentis* occurred at Buffalo, N. Y., in a provision store where imported lentils were kept on sale, and was distributed to cabinets under the name of *B. rufimanus*, but did not acclimate. *B. obsoletus*, Say, is discussed in twenty-five pages. It was first discovered at Providence, R. I., in 1860. The beans supplied to the soldiers of the armies during the war of the Rebellion were largely infested with it. It spread slowly westward to and beyond the Mississippi and northward but is not known to have entered Canada so far, Mr. Lintner. *B. obsoletus* was prevalent here several years ago, but has entirely disappeared, none having been observed by cultivators in its old haunts for about five years. No means of extermination, nor to prevent its spread, were employed. It is certainly extinct here. That it may likewise become extinct from climatic causes, at least in the Northern States, is far from improbable. According to Mr. A. Fauvel this *Bruchus* is of Neotropical origin and native in Central and South America. This clearly accounts for its non-acclimatization in Canada, and holds out a hope of its eventual extinction here. Through favouring conditions it was spread very widely, but except in a few localities it is

now scarcely known. Some climatic condition may likely make it a thing of the past. How, whence, and when it was introduced along the Atlantic sea coast is unknown; it could scarcely have been from Europe, as it is little known there where it is a very recent importation. If the "buggy" beans fed to the soldiers in the North and South during the war of the Rebellion were raised in these respective regions, it is evident the insect must have been widely spread previously to 1860; if beans were imported in large quantity, it would shed much light, were the countries known from which they had been brought. It is quite probable the present invasion is not the first visit this insect has made to North America, but on any former occasion it could not have met with so good entertainment. Through commercial intercourse with southern countries it probably reached Louisiana during the first part of the present century, and was transported northward as far at least as the State of Indiana, where Say found it. Whether the insect described by Say was the same species which depredates on beans is sometimes questioned, because the examples from which he made the description were obtained from the seeds of a something he terms *Astragalus*. His description is, however, so applicable in many points to the bean *Bruchus* that had he written "obtained from beans," the question would likely never have been raised. Besides it is neither food habits nor locality which constitutes a species. What Say meant by an *Astragalus* is uncertain, probably the *Wistaria frutescens*, as none of the species of the genus *Astragalus* as now constituted, which grows in that part of Indiana has seeds sufficiently large to breed the insect. Much more might be said. Suffice it to say that if the examples Say described belonged to the foreign species, that species existed there only temporarily, and long ago disappeared, as it has certainly lately done from this locality. If it is a native species, then it is almost certainly in existence in that part of Indiana, depredating as in Say's time on *Astragalus*, whatever that may be. To reject Say's name before a species of *Bruchus* shall have been found in Indiana raised from some native Siliquose plant or tree to which his description shall apply as well or better, would seem, to say the least, an arbitrary and unnecessary proceeding.

This species is now widely distributed through the warm countries of the globe: Central and South America, West India Islands, Madeira, the Canaries, the Azores, the countries of Europe, Africa and Asia bordering the Mediterranean, Persia, etc.

A NEW SPECIES OF EUDAMUS.

BY HENRY SKINNER, M. D., PHILADELPHIA, PA.

Eudamus coyote: Expands 2⅛ inches. Primaries dark glossy brown, several shades darker than *Eudam. bathyllus*; fringes of same colour as the wings. The apices of the wings run more to a point than in other species of the genus. There are no markings on the primaries, although there are some very faint indications of markings, which are not brought out by transmitted light. Secondaries immaculate and same colour as primaries, but with well marked dirty white fringes. The secondaries are not tailed but are somewhat pointed as in *E. epigena*. Underside: Primaries lighter in colour than above with some light coloured scales along the costa which faintly indicate a spot about the middle of costal margin; directly below this in the cell is another very faint spot. There are three dark spots between the subcostal nervules, extending downward in a row and about an ⅛ inch from the exterior margin, the upper spot not being in an exact line with the two lower ones; just below these, but further from the margin are three others in the spaces between the discoidal nervules. These spots are lighter coloured in the centre and the central spot of the three is not in line with the other two but nearer the body of the specimen. These spots are not very well defined and vary somewhat in the individuals. Fringes same colour as wings. Inferiors are crossed by two bands of darker colour which are about ⅛th in. in width and they extend from costal margin almost to the inner margin; the upper band is broken by having one of its spots in the cell and above this in the cell is another dark spot. The fringes are white as above and the white terminates at junction of exterior and inner margins; fringes on inner margin are very dark, almost black, as is also the point of the wing and adjacent parts. Body, head, legs, etc., dark brown; palpi distinctly gray; there is a gray white line made up of short hairs, extending around the under side of the eyes. Described from five specimens from Southern Texas in collection of author. The specimens are not in very good condition and the description is taken from the most perfect one.

NOTES ON NORTH AMERICAN TACHINIDÆ, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.—PAPER VI.*

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

This paper contains descriptions entirely of Southern New Mexican forms, with the exception of two from the State of Chihuahua, Mexico.

Sarcomacronychia sarcophagoides, n. sp. ♀.

Eyes brown; frontal vitta narrow, blackish, front one-fourth width of head; sides of front, face and cheeks silvery-white; the double rows of frontal bristles nearly equal; vibrissæ distinct, short, decussate, inserted well above oral margin; antennæ and arista blackish, second antennal joint slightly rufous at ends, third one and a-half times as long as second; proboscis black, labella brown; palpi slender, brown; occiput cinereous, short black-bristly. Thorax, scutellum and abdomen cinereous, more or less faintly brassy, with three blackish vittæ, the middle one continued over scutellum and abdomen, the lateral ones more or less distinct on sides of scutellum and more broadly and irregularly continued on sides of abdomen to anal segment, the abdomen more distinctly brassy or golden, anal segment wholly rufous, deep golden pollinose at base, hind margin of third rufous; humeri and pleuræ silvery-whitish; second segment with a pair of median marginal macrochaetæ, third with a marginal row of twelve or more, anal with about four marginal. Legs black, femora silvery on outside, claws and pulvilli a little elongate, pulvilli whitish. Wings hyaline, veins more or less brownish, tegulæ white; halteres rufous, knobs yellowish.

Length of body, 7½ mm.; of wing, 5 mm.

Described from one specimen; Las Cruces, New Mexico. June 9. This species bears a striking superficial resemblance to one of the smaller *Sarcophagidæ*.

Brachycoma chihuahuensis, n. sp. ♂.

Eyes brown; frontal vitta dark brown; front about one-third width of head, frontal bristles in a single row descending to base of third

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antennal joint, no orbital bristles; sides of front, sides of face and occipital orbital margins silvery-white; facial depression and cheeks silvery-gray; cheeks pubescent, facial ridges bare save some weak depressed bristles above vibrissæ; antennæ entirely light rufous, arista brown, third antennal joint hardly twice as long as second, quite peg-shaped; proboscis fleshy, shorter than height of head, blackish, palpi pale rufous; occiput cinereous, gray-hairy. Thorax cinereous, with five black vittæ, the middle one arising at suture, the outer ones rather heavier than the inner pair; scutellum rather silvery, testaceous or tawny at apex. Abdomen shining black, anal segment rather dark rufous, whole abdomen faintly cinereous pollinose. Legs black, claws and pulvilli elongate, pulvilli fuscous. Wings grayish-hyaline, veins tawny; tegulæ white, halteres tawny.

Length of body, fully 8 mm.; of wing, 6 mm.

Described from one specimen; Chihuahua, Mexico. Mex. Cen. R. R., August 4. This specimen apparently shows a very faint rufous tinge on sides of abdomen.

Hypertrophocera parvipes, Twns. Trans. Am. Ent. Soc., XVIII. A specimen taken June 26, Las Cruces, N. M., was damaged by moisture. It shows scutellum and abdomen wholly rufous, except a heavy median black vitta on latter. It measures 6½ mm.

EUCNEPHALIA, n. gen.

Facies of *Cnephalia*, with head (except arista) of *Gonia*. Belongs in *Phoroceratinæ*. Head rather quadrilateral in profile. Front (♀) one-half width of head, narrower at vertex, face a little wider; frontal bristles in two rows, descending about to base of third antennal joint, with smaller bristles among them which are continued in broken rows on the wide sides of face and cheeks, as in *Cnephalia*; two orbital bristles (♀). Face nearly perpendicular, epistoma prominent; facial depression a little more than one-third width of face, shallow; facial ridges with bristles more than half way up, constricted considerably above oral margin where the short decussate vibrissæ are inserted; sides of face very wide, cheeks nearly two-thirds eye-height. Eyes bare. Antennæ inserted above median line of the eyes, shorter than face, second joint slightly elongate, third about three times as long as second; arista shorter than third antennal joint, thickened its whole length, bare, 3-jointed, second joint elongate. Proboscis shorter than height of head, rather stout but not fleshy,

labella present; palpi long, rather slender, thickened and curved at tip. Thorax and abdomen not quite as wide as head; scutellum with a strong sub-apical and two strong lateral pairs of macrochaetæ, and a shorter discal pair. Abdomen elongate oval, not flattened, first segment a little shortened; macrochaetæ only marginal. Legs moderately long, femora rather stout and bristly, middle and hind tibiæ spiny; claws and pulvilli of ♀ a little elongate. Wings longer than abdomen, without costal spine, third vein bristly at base; apical cell open, terminating before tip of wing; fourth vein bent at obtuse angle, with a wide, shallow wrinkle at bend appearing as a slight cloud, apical cross-vein a little concave; posterior cross-vein curved or sinuate, nearer to bend of fourth. Type *E. gonoides*, n. sp.

This genus differs from *Cnephalia* in the character of the antennæ and arista, and in the facial ridges being bristly. It differs from *Frontina* in having the sides of face bristly, as in *Cnephalia* and *Gonia*.

Eucnephalia gonoides, n. sp. ♀.

Eyes light brown; frontal vitta brownish; sides of front, face and cheeks silvery white; antennæ pale rufous, blackish on apical half more or less of third joint, arista black; proboscis blackish, palpi light rufous; occiput silvery, rather thickly clothed with yellowish gray hair. Thorax silvery pollinose, with five narrow black vittæ, the middle one obsolete in front, the inner pair obsolete a little behind suture, others reaching scutellum, eight rows of macrochaetæ on thorax; scutellum silvery pollinose, blackish at base, testaceous at tip. Abdomen black, reddish on sides of first to third segments, second to fourth segments silvery-white pollinose except the more or less narrow posterior margins; first two segments with one lateral macrochaeta and a median marginal pair; third with a marginal row of ten or twelve; anal segment with a marginal row of eight or ten; venter reddish, with median vitta and anus blackish. Legs black, femora silvery below, tibiæ with spiny macrochaetæ except front ones, claws and pulvilli only a little elongate, pulvilli yellowish fuscous. Wings grayish, tegulæ white, halteres brownish.

Length of body, 9⅔ mm.; of wing, 7½ mm.

Described from one specimen; Dona Ana County, New Mexico. Apache Canon. Oct. 18.

Rhinophora valida, n. sp. ♂.

Eyes brown; frontal vitta light rufous, front narrowed before ocelli to

about one-fifth width of head; sides of front, and face silvery-white; cheeks long and wide, compressed, silvery cinereous behind, pale rufous anteriorly, the under side of head below eyes having a singularly narrowed and elongate apperance in front view; antennæ and arista black, first two antennal joints and base of third light rufous, arista long pubescent; proboscis blackish, labella light brownish, palpi pale yellowish rufous; occiput silvery cinereous. Thorax and scutellum silvery cinereous. Abdomen black, silvery cinereous, hind margins of segments usually blackish; second segment with a median marginal pair of macrochaetæ, third with a median discal pair, anal segment armed with discal and marginal macrochaetæ and bristles. Legs blackish, front femora slightly silvery cinereous, claws and pulvilli elongate, pulvilli tawny fuscous. Wings grayish-hyaline; veins blackish, especially cross-veins; apical cross-vein sinuate, fourth vein bent at an angle with slight stump at bend, hind cross-vein very near to small cross-vein; tegulæ nearly white, halteres yellow.

Length of body, 4 mm.; of wing, nearly 3½ mm.

Described from one specimen; Las Cruces, New Mexico. San Andreas Mts. August 21.

Rhinophora mexicana, n. sp., ♂.

Eyes light brown or dark brown; frontal vitta deep blood-rufous, front about two-ninths width of head behind, wider in front, face widening at about same angle: sides of front, sides of face and facial depression silvery-white, more or less golden on front, the sides of face with some bristles which are longest below, frontal bristles not descending below antennæ, no orbital bristles; cheeks nearly all comprised in the rufous-brown pregenal area, which is always bare; antennæ short, pale rufous or yellow, the third joint almost wholly or only at tip blackish, little longer than second; arista blackish, pubescent; proboscis brownish, about as long as height of head, palpi small, yellow; occiput cinereous, somewhat brassy or golden, black-bristly. Thorax and scutellum silvery-gray pollinose, more or less golden, with four darker vittæ interrupted at suture. Abdomen silvery-gray pollinose, more or less distinctly golden, first segment blackish at base; first segment with a lateral mocrochaeta and bristles; second with a lateral marginal pair, usually a weaker lateral discal one or two, and a median marginal pair; third with several lateral discal ones and a more or less complete marginal row; anal segment with a more or less regular discal and marginal row. Legs black, femora more or less

silvery, tibiæ bristly, claws and pulvilli elongate, latter smoky tawny. Wings grayish-hyaline, transverse and fourth veins black, other veins more or less tawny; tegulæ nearly white, halteres light rufous.

♀.—A specimen which I take to be the female of this species differs in having no golden shade, except very faintly on scutum; the front is hardly one-fourth width of head, and there are no orbital bristles. Macrochaetæ hardly as thick; claws and pulvilli scarcely shorter.

Length of body, ♂, 5 to 6⅓ mm.; ♀, 6⅓ mm.; of wing, ♂, 4½ to 5½ mm.; ♀, 5½ mm.

Described from six males and one female; Las Cruces, N. Mex. June 3.

Leucostoma neomexicana, n. sp. ♂.

Eyes brown; frontal vitta velvety black; sides of front, face and cheeks silvery-white, the sides of front shading to dark, epistoma whitish; antennæ and arista black, the third antennal joint no longer than second; proboscis about as long as height of head, blackish, labella brownish; palpi rufous yellow; occiput black, black-hairy. Thorax and scutellum dark bluish-black, shining. Abdomen shining black, last two segments thinly silvery pollinose; first segment with a lateral pair and a median marginal pair of macrochaetæ, other segments with a marginal row; whole abdomen clothed with long macrochaeta-like bristles, making the real macrochaetæ difficult to distinguish, whence the first segment might almost be said to have a marginal row. Legs black, claws and pulvilli elongate, pulvilli silvery. Wings almost hyaline, veins tawny at base; tegulæ very large, pure white; halteres blackish.

Length of body, 4½ mm.; of wing, nearly 4 mm.

Described from one specimen; Las Cruces, New Mexico. June 29. This species has the third antennal joint no longer than the second, and is therefore distinct from the species described by v. d. Wulp and doubtfully identified by him as *L. analis*, Meig. (Biol. C.-A. Dipt. II.). His species is perhaps a *Leucostoma*, but the second species, *L. gravipes*, v. d. W., is probably a *Phyto*. *Leucostoma* should be restricted to the smaller species with unusually large tegulæ.

Phyto nigricornis, n. sp. ♂.

Eyes very dark brown; frontal vitta soft black, sides of front shining black, more or less silvery, the front about one-third width of head in middle; face and cheeks black, thinly silvery pollinose, the cheeks black hairy and with brownish pregenal area; frontal bristles rather thick and strong, no orbital bristles; vibrissæ inserted considerably above oral margin, strong, decussate; antennæ and arista black, second antennal joint brownish, third joint no longer than second; proboscis black, labella brownish, palpi light rufous; occiput black, more or less silvery or cinereous, black-hairy. Thorax shining black, very faintly, almost imperceptibly, grayish pollinose; scutellum black. Abdomen shining black, first segment faintly, others more distinctly, yet thinly, silvery or grayish pollinose; first segment with two or three lateral macrochaetæ and four median marginal ones, segments two to four with a marginal row; hypopygium more or less exserted. Legs black, rather stout, claws and pulvilli elongate; claws blackish, pulvilli smoky-whitish, black at base. Wings grayish-hyaline, slightly tawny at base, veins brownish; tegulæ whitish, shining, borders narrowly tawny; halteres rufous, knobs blackish.

♀.—Front about one-third width of head but nearly equilateral, while in the ♂ it is much wider before than at vertex; two orbital bristles. Abdomen terminated by a forceps, the whole abdomen shining black, not pollinose; the macrochaetæ weaker, and second segment with same number as first. Claws and pulvilli much shorter, yet somewhat elongate.

Length of body, ♂, 5 to 6 mm.; ♀, 4½ mm.; of wing, ♂, 4 to 5 mm.; ♀, 3½ mm.

Described from seven males and one female; Las Cruces, New Mexico. One male taken Sept. 20, all the others Oct. 25.

MUSCOPTERYX, n. gen.

Belongs in *Phytoinæ*. Head more or less rounded in profile. Front of ♂ averaging about one-third width of head, gradually widening from vertex forward, face widened at same angle; frontal bristles in single row, descending on sides of face not quite to lower border of eyes, those on front stronger, vertical bristles strongest and, with next pair, directed

backward, others more or less forward, inward, decussate; two orbital bristles in ♂. Face somewhat receding, epistoma not prominent; facial depression about one-half width of face, shallow; facial ridges bare except a bristle or two next vibrissæ, latter rather strong, decussate, inserted at a very slight constriction of the ridges a little above oral margin; sides of face of moderate width, bare except for frontal bristles; cheeks hardly one-fourth eye-height, bare except row of bristles on lower margin. Eyes thinly hairy. Antennæ short, hardly two-thirds length of face, second joint slightly elongate, third joint hardly as long as second, rounded; arista thickened on basal third, nearly bare, apparently two-jointed, basal joint short. Proboscis short, about two-thirds height of head, fleshy, part below geniculation hardly longer than that above, labella developed; palpi small, very slender, filiform, bristly. Thorax about as wide as head; scutellum with an apical decussate, and two lateral pairs of macrochaetæ. Abdomen narrower than thorax, ovo-conical, first segment not shortened; macrochaetæ marginal and discal, strong; hypopygium concealed. Legs moderately long and stout, bristly; claws and pulvilli of ♂ quite elongate. Wings longer than abdomen, with costal spine, third vein bristly at base; apical cell closed in border very little before tip of wing, fourth vein bent at angle without stump or wrinkle, apical cross-vein a little concave; hind cross-vein sinuate, nearer to bend of fourth vein. Type *M. chætosula*, n. sp.

Muscopteryx chaetosula, n. sp., ♂.

Eyes dark brown, blackish; frontal vitta brownish, silvery; sides of front, face and cheeks silvery-white, the pregenal area extensive, brownish, silvery; antennæ and arista blackish, first two antennal joints rufous; proboscis dark brownish, palpi pale tawny; occiput silvery, gray-hairy below. Thorax densely silvery-gray pollinose, with five rather indistinct cinereous vittæ, the middle one obsolete before suture, the outer ones interrupted at suture; scutellum, humeri and pleuræ silvery. Abdomen almost entirely silvery pollinose, the hind margins of segments darker, slightly brassy in some lights; first segment with a strong lateral macrochaeta, besides other bristles and a median marginal pair; second with a lateral pair, a median marginal, and a weaker median discal pair; third with a weak median discal pair, and a marginal row of very strong macrochaetæ; anal segment with more or less irregularly placed marginal

and discal ones. Legs black, femora silvery on outside, pulvilli whitish. Wings grayish-hyaline, tegulæ nearly white, halteres pale rufous.

Length of body, 6 mm.; of wing, 4½ mm.

Described from one specimen; Chihuahua, Mexico. Mex. Cen. R.R., August 4.

Vanderwulpia sequens, n. sp. ♂.

Eyes brown; frontal vitta dark brown; sides of front, face and cheeks silvery-white, the sides of front slightly brassy next vitta; two orbital bristles; antennæ blackish, slightly rufous at end of second joint, arista blackish; proboscis black, palpi black, rufous at extreme tip; occiput silvery-white, brassy above, gray-hairy. Thorax silvery-white, with two heavy deep black vittæ reaching scutellum, portion between vittæ more or less brassy; scutellum silvery, edged with black on sides continuing on sides of thorax posteriorly. Abdomen shining black; bases of segments two to four narrowly silvery-white pollinose, faintly so on basal half, first segment faintly silvery, anteriorly on sides and beneath; first two segments with one lateral macrochaeta and a median marginal pair; third with eight marginal, and anal with about as many marginal, which are not so strong. Legs black, femora silvery beneath, especially front pair; front coxæ long, silvery; middle and hind claws and pulvilli a little elongate, anterior ones minute. Wings golden fuscous on costal portions, grayish internally, more smoky towards apex, apical and hind cross-veins smoky; fourth vein with decided wrinkle at bend, apical cell extremely short petiolate; tegulæ white; halteres black, rufous at base.

Length of body, 8½ mm.; of wing, 6½ mm.

Described from one specimen; Las Cruces, New Mexico. August 26. This species differs from the type species of the genus *V. atrophopodoides*, Twns., in having the apical cell not moderately long petiolate, but closed immediately before margin. The arista is long pubescent, and this genus belongs in the *Dexiidæ;* although the genus *Atrophopoda*, so closely allied to it in the structure of the front feet, belongs by the character of the arista in the *Tachinidæ* s. str.

INSECTS ATTRACTED BY FRAGRANCE OR BRILLANCY OF FLOWERS FOR PURPOSES OF CROSS-FERTILIZATION.

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Nowhere in the flora or insect fauna do we see it better illustrated than by some of our *Argynnids* and *Asclepiadaceæ*. It must therefore be admitted that these Asclepiads are striking examples of entomophilous or insect-loving plants, and anyone in quest of insects will not be disappointed by dilgently studying the distribution of the Milk-weed family. Lepidoptera and hymenoptera visit these plants. Some flowers attract insects for the purpose of cross-fertilization, and these are either showy, brilliant in colour, or more or less fragrant. All other flowers are either wind-fertilized or self-fertilized. Insects resort to flowers for the purpose of obtaining honey—their food, secreted by the nectaries, or to take pollen found on the stamens of flowers; the former constitutes their staple of life and the latter furnishes wax to others for utilitarian purposes. Lepidoptera take food by suction and it must be of a liquid nature. Thus it will be seen that the relation of certain insects to flowers is really of absolute necessity.

Darwin's attention was early drawn to flowers of *Asclepias*, because the mass of pollen grains was borne on a foot-stalk, which had a sticky gland at the end of it, as found in Orchids. Modern geological research has demonstrated that lepidoptera first made their appearance during the *Tertiary* period, when true flowers began to be abundant. And so it is to this day. Bright-coloured and highly perfumed flowers are always associated with myriads of insects, of which butterflies and moths contribute a large number. This is the reason why some of the larger Argynnids, such as *A. idalia* and *A. cybele*, are found to the best of advantage on flowering Asclepiads. When the various species of *Asclepias* are in full bloom, the Argynnids mentioned and even *A. aphrodite* may be looked for in more or less abundance.

Red Clover blossoms are resorted to by Argynnids before the advent of Milk-weed flowers, but I have never observed them there in such numbers. Another drawback to collectors, for reasons well understood, is that he must visit the locality when the owner of it is at church or taking his meal! I have seen a few *A. cybele* as early as May, on the azure flowers of *Echium vulgare*, known as Blue-weed and Viper's Bugloss, a very prickly plant introduced from Europe, found on poor, sandy soil. Papilios as well as Argynnids visit all these plants, in company with

many other insects. When Milk-weeds are past bloom these Argynnids visit *Cnicus pumilum* or low Pasture-thistle, and other species. Later on they betake themselves to the gardens, and visit the flowers of *Zinnia elegans* and *Verbenas*.

In the latitude of Long Island and Northern New Jersey the *Asclepiadaceæ* flower in the following order :—

First of all, *Asclepias cornuti*, Silk-weed or Common Milk-weed ; then comes *A. purpurascens*, or Purple Milk-weed ; next *A. tuberosa*, or Butterfly-weed ; and finally *A. incarnata*, the Flesh-colored Asclepias or Swamp Milk-weed. I have found that *A. purpurascens* and *A. incarnata* will attract more of Argynnids, Danaids, Hesperids, Macroglossids and Hymenoptera than the other plants mentioned, when two or more species are in bloom at one time. Of these, *A. tuberosa*, with its orange-colored flowers, can be farthest seen, but comparatively speaking it is not fragrant to our senses, or very faintly so. *A. purpurascens*, the most fragrant, is much visited by Argynnids and Pamphilas, and after that comes *A. incarnata*. The last is the more plentiful plant, and inhabits swamps and margins of streams.

It is not an uncommon sight to behold a corymb of either of these *Asclepiadaceæ* in the possession of two or three Argynnids, several Skippers and Hymenoptera at one and the same time. All but the Swamp Milk-weed affect a gravelly or poor sandy soil, and may be found along the roadside, on railroad embankments, in fallow fields or skirting sylvan paths. To obtain the sweets from the innermost recesses of the five-lobed corolla, the lepidopterous insect almost buries its head within the flower. Those with a very long proboscis keep a weather eye open, so to speak, to warn them of approaching danger. This nectar must exert an almost intoxicating effect on the insectiferous sense, else Argynnids would not suffer one to approach them so closely while extracting honey from the nectariferous glands. The flowers of *A. cornuti* have longer pedicels than any other species, and the umbels do not present so compact a head of flowers as in the other mentioned species This drooping of flowers may be of disadvantage to diurnals with long probosces, and is, I believe, a good reason why Argynnids prefer to explore the more upright-standing flowers of other Asclepiads. The flower of *A. cornuti*, or Milk-weed, is not brilliant, a greenish-white delicately tinted with purple, but emitting a powerful fragrance. Although the larva of Danais archippus feeds on the leaves of *A. cornuti*, yet the imago takes its food very seldom from this flower, when other species are conveniently near.

The flowers of *A. tuberosa* can be recognized at a long distance, and are readily singled out by Lepidoptera. Though almost devoid of perfume* it abounds in honey. This proves that both colour and fragrance of flowers draw heavily on the senses of Lepidopterous insects. Many Nymphalidæ also visit the flowers of Milk-weeds.

Even on a windy day numbers of Argynnids and other Nymphalids, Hesperids, etc., may be found on these Milk-weeds, but rarely in the open. Patches of or single plants must be searched for in sheltered, wooded regions of fen and forest. To illustrate, I will state that the day after that Jamesburg, N. J., 4th of July, entomological field meeting, I went up to Westchester County, N. Y., just north of the city line. I netted a few Argynnis cybele from isolated plants of *Purple Milk-weed*, found in a grass-covered lane of the forest. It was as windy, if not so noisy, a day as it had been in Jamesburg, and the flowers of the open field were devoid of insects. Emerging from the forest, I entered a bog well hedged in by tall shrubs and young trees, and suddenly came upon a patch of very tall *Asclepias purpurascens*. These grew in the midst of a clump of Black Alder, Bayberry, Tall Blueberry bushes and Blackberry briars. The flowers were from five to six feet above ground and partially hidden by shrubbery. In passing close by I started up a large number of frightened *A. cybele*, which kept me busy for some time afterward. To get at the flowers I had to cut away branches and briars, and before leaving took a dozen and a-half of fine *A. cybele*, one *A. idalia* and numbers of Hesperidæ. I could have obtained more, but it grew to be rather monotonous work and went home. This may seem rather "windy" for a day when the Zephyrs blew small guns. But anyone can do the same, if not better, by studying the physical geography of localities. It repays for all the trouble. In the Western Catskills one of my nephews takes *A. aphrodite*, *A. cybele* and *A. bellona* sometimes in numbers on a fragrant species of *Solidago* or Goldenrod.

In the autumn I examined many of the asclepiadaceous plants, where last summer I had secured most of my Argynnids and other diurnals visiting *Asclepias*. Those species bearing the largest number of fruit pods corresponded with the plants on which I observed the most lepidopterous insects. There were single stems of *Asclepias incarnata*, on the tops of which I counted fifty-two seed follicles, and some of its flower-heads had from six to twelve seed-pods thereon. On *Asclepias*

* The sense of smell is very acute in insects, and they are attracted to nidorous flowers by a faint odour of the honey, which is imperceptible to mankind.

purpurascens I observed from one to five seed-pods on a plant stalk. But it was the exception to notice a plant of *Asclepias tuberosa* which bore any fruit at all, and perhaps only one on half a dozen flowering stems given off by a single root. The scarcity of silk pods on this species was indeed very noticeable. Plants of *Asclepias cornuti* are not very well covered with fruit. I examined a large number of plants late in October, 1891, and found only from one to four seed follicles on large plants. The flowers of this species of Milk-weed are drooping from the axils of very large leaves, and are more or less hidden by the latter.

Asclepias phytolaccoides, or Poke Milk-weed, another fragrant species with long-peduncled umbels of greenish-white and purplish colour, grows in most woods. Its nodding umbels and dependent flowers are of disadvantage to the visits of the larger diurnals. The plant is less abundant than other species referred to. It prefers dense copses and is visited more perhaps by nocturnals than diurnals. Height from 3–5 feet.

Asclepias quadrifolia, or four-leaved Milk-weed, known by its whorls of leaves, is met with in dry woods overlying limestone rock. It also has loose-flowered and long-stalked umbels, and is fragrant. Flowers, pale pink with a white crown. Height of plant 1–2 feet, our smallest species. In colour and the shape of its flower-heads, also drooping, it much resembles *A. cornuti*, our tallest of the Milk-weeds found on the roadside.

Asclepias curassavica, or Bastard Ipecac and Blood-weed, is a prominent landmark of the West Indian Islands. It is the gayest and commonest weed of Trinidad, and found also in So. Florida. Jamaican negroes call it Redhead. It has a scarlet corolla and yellow appendages; flowers borne erect on umbels; grows about three feet high. Nymphalids and Danaids, as well as Lycænids, frequent its flowers. Inasmuch as all these Milk-weeds can be classified under bee-food, they are much visited by insects.

Dr. J. E. Taylor, of Ipswich Museum, England, thinks that mostly all the white or light-yellow flowers are cross-fertilized by night flying moths. Not only can they be distinguished at a greater distance on account of their luminosity than those of more brilliant hues, but their sweet-smelling properties will be a guide to moths. A larger proportion of white flowers emit fragrance than that of any other colour. And he tries to substantiate his conclusions by the following statement: "If we could take a census of British wild flowers, we should probably find that the most numerous colours are in proportion to their *luminosity*, or the

ease with which they can be seen from the greatest distance. There are about twenty-five times more species of British moths than butterflies, and they are of all sizes, so that in this respect they suit all magnitudes of white flowers." Koehler and Schubler long ago made the same observation regarding colour and odour of flowers.

I think that in the case of the *Asclepiadaceæ* this holds good, because those preponderating in whitish or yellow flowers are less visited by diurnals than the red and purple-coloured species. I must mention here another curious circumstance relating to the aversion that Argynnids and diurnals exhibit toward *white* Zinnias, and Verbenas of the same colour.

In August or September of each year I look for Argynnids on these plants, when Milk-weeds are past bloom. In the season of 1890 I made numerous trips to a horticultural garden, where Zinnias, Verbenas and other plants were cultivated by the acre. There were beds of Zinnias, seventy-five feet long by twenty in width, of separate and mixed colours; five large beds, three of separate and two of mixed colours, all starting from a summer-house to the points of the asterisk, on a lawn 4–5 acres in extent, could be readily observed from the centre of this floral star. One bed contained fulvous-tinted Zinnias, another white, the next crimson, and two beds were planted with Zinnias of mixed colours, all but white. I have repeatedly watched these gorgeous flower-beds from 10 a.m. until 5 p.m., in warm, calm and clear weather, with the following result:

To the bed of *white* Zinnias only Pieris and a few Colias made their visitation, and but on a single occasion have I observed any other diurnal on these white flowers, and it was a single specimen of Papilio turnus. The two beds of fulvous and crimson Zinnias attracted many of the Argynnids, three of the large species, different Pyrameis, many Papilios, L. disippus, some Hesperidæ and day-flying moths. The other two beds of Zinnias, made up of mixed colours, in addition to lepidoptera mentioned, also attracted Colias and Pieris (a few) to their sulphur-coloured flowers, four species of Papilios and a few Euptoieta Claudia.

Zinnias are inodorous to our sense of smell, but the honey they contain and the fiery colours of their flowers are very attractive to lepidopterous insects. In the case of Zinnias and Verbenas, another brilliantly flowering and nidorous plant, it would seem that the gorgeousness of blossom serves the purpose of attracting diurnals for purposes of cross-fertilization. Plots of Verbenas, an acre and more in extent, I have watched with similar result. One man had more than two acres planted with only *white* Verbenas, and it was in possession of Pieris rapæ principally. The other contained all known colours, including a few white, and the plants were freely visited by Argynnis, Papilios and a number of other diurnals, as well as by Hemaris thysbe. The last mentioned appeared a little before twilight, about seven o'clock.

NEW NORTH AMERICAN MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Pyrausta nigralis, n. sp.

Expanse of wings, 18 mm. The entire body and wings above and beneath, black; pectus and base of the palpi, snow white. The outer line is represented by a nearly straight, snow white stripe, which starts from the outer third of the costa and extends nearly half way across the wing and a spot on the fold near the outer third of the hinder margin below a similar spot on the end of the cell. There is also a white spot in the fringe below the apex and one at the anal angle, and the costal cilia are snow white. The hind wings have a small white spot at the base, another a little beyond the cell and an oblique stripe extending up from the anal angle. All these white spots and stripes are reproduced on the under side.

Described from three examples :—One in the collection of the National Museum, collected by Boll in Texas; one in the collection of Rev. Geo. D. Hulst, and one in my own collection. The last two were taken in March at Cold Harbor, Fla.

Teras angusana, n. sp.

Expanse of wings, 17 mm. Head, palpi and thorax, pale reddish-white. Fore wings, pale red with a somewhat darker red stripe extending from the middle of the base to the apex and edged with white on each side, but more prominently on the hinder side. An inconspicuous elongate spot of a leaden blue colour rests on the middle third of the hinder margin. Fringes, concolorous. Hind wings and abdomen above, silky gray, lighter beneath. Under side of fore wings, pale grayish-red.

Described from one specimen received from Mr. James Angus, for whom I have named the species, and one taken by myself in Orono, Me., Aug. 1, 1884.

Steganoptycha lindana, n. sp.

Expanse of wings, from 18 to 20 mm. Head, palpi, thorax and hinder part of fore wings, pale gray, the latter somewhat sprinkled with brown. The outer sides of the palpi, front of the head and forward part of the patagia are more or less tinged with purplish brown. The costal half of the fore wings is dark brown with purplish reflections and darker oblique costal streaks. The darker portion of the wing sends two very dark brown triangular prolongations backward to the fold, one at the basal third and the other a little beyond the middle.

The fringes are gray and flecked with brown. The hind wings and abdomen above are silvery gray, and the under side of the hind wings is the same as above, but reticulated with darker gray on the costa and the outer border. The under side of the fore wings is somewhat darker than the hind wings and shows the markings of the upper side to some extent. Described from one specimen taken in Hamilton, Ontario, and one taken at light in Amherst, Mass., Sept. 18, 1887.

I take great pleasure in naming this beautiful insect for Miss Rose Linda Davis, who has ably assisted me in my entomological work for the last three years.

NEW FORMS OF ICHTHYURA.

BY HARRISON G. DYAR.

Ichthyura multnoma N. SP.

Ground colour of primaries dark "ecru drab" (Ridg. iii., 21, * but much darker), heavily irrorate with "clove brown" (Ridg. iii., 2.) scales which almost entirely obscure the ground colour at the basal portion of the wings as well as outside the third and fourth lines. First (basal) transverse line faintly yellowish, inwardly arcuate from internal margin to median vein, then rectangularly bent towards the base and following the median vein for about 1.5 mm., when it is again bent at right angles and proceeds straight to costa. Second line before middle of wing, consisting of a line of the ground colour bounded outwardly by a narrow clove brown line, straight across wing from internal margin to costa. Third line slightly yellowish, outwardly arcuate from internal margin to vein 2, just beyond its origin, faint across cell, consisting there of a line of the ground colour apparently running straight to costa. Fourth line starting on internal margin, near origin of third line, and running slightly obliquely, but nearly straight to the costa subapically. It is undulated across the subcostal nervules, but is not broadened at costa nor marked with white, being uniformly yellowish. Outside this line subapically, an irregularly triangular rusty brown patch, and another fainter patch on the middle of external margin. A submarginal row of clove brown spots, distinct only below vein 2, being elsewhere lost in the general dark shading of the terminal half of the wing.

Thorax dark gray; the vertex of head and central thoracic patch, deep blackish brown. Abdomen, secondaries and whole under surface,

*Ridgway's nomenclature of colours, plate iii., fig. 21.

nearly uniform seal brown (very near Ridg. iii., 1, perhaps of a colour between figs. 1 and 2). Expanse, 31 mm. Described from 2 ♂ ♂, Portland, Multnomah Co., Oregon, April 23.

Ichthyura albosigma Fitch., var. *specifica* n. var,

I apply this name to the form of *I. albosigma* from the Rocky Mountains, which differs from the type by its much paler colour. Specimens taken at Manitou, Colorado, May 2.

In accordance with my custom in describing new forms, I give below a table to separate the species of the genus. Under the term "*vau* Fitch and allies," I refer to the nominal species *inversa*, Pack., *vau* Fitch, *brucei*, Hy. Edw., *bifiria*, Hy. Edw., *astoriæ*, Hy. Edw., *ornata*, G. & R., and *inornata*, Neum. I have not at present the necessary material to form a positive opinion as to the synonymy involved here, but I doubt if there are more than three good species, the other names referring to geographical varieties of much the same rank as the var. *specifica* above described.

The names *apicalis*, Barnst., and *incarcerata*, Bd., included in Prof. Smith's list, I have not considered here; but I hope to be able to offer a complete revision of Ichthyura at a subsequent time. The following table will show the relationships of the new forms described in this paper.

§1. Third transverse line running from internal margin at or near the origin of the fourth line and joining the second line at or about its middle.

Fourth line widened and white at costa.

A series of subterminal interspaceal dots.

Lines generally straight, - - *inclusa*, Hb.

Lines more or less, waved, *vau*. Fitch and allies.

Same produced into a series of dashes.

With usual thoracic mark, - - *strigosa*, Grt.

This mark absent on thorax, *luculenta*, Hy. Ed.

No white on fourth line at costa - *jocosa*, Hy. Ed.

§2. Third transverse line free from internal margin to costa.

General colour, dark grayish or clove brown.

Fourth line not widened on costa, *multnoma*, Dyar.

Fourth line widened and forming a white S-shaped mark, - - - - *albosigma*, Fitch.

General colour, much paler, - - var. *specifica*, Dyar.

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S. FOR 1892.

The Annual Meeting of the Entomological Club of the A. A. A. S. will be held during the meeting of the A. A. A. S. at Rochester, New York, August 17th to 20th, 1892, at such times as will least conflict with other features of interest to members. The meeting of the Association of Economic Entomologists, which will be held at the same time and place, will add to the attractions for all interested in the science, and it is hoped that members will make it a point to be present and assist in making the Rochester meeting a successful reunion of all the working entomologists of America. It is urged, also, that every member prepare a paper or papers for presentation before the Club, furnishing the Secretary with the titles in advance, so that a preliminary programme may be drawn up. As most of the members of the Club are also members of the Association of Economic Entomologists, it is suggested that subjects relating to applied entomology be presented before the latter society, reserving for the Club matters of a more purely scientific interest. Systematic, biologic or anatomical studies, together with collecting notes, are especially desired and appropriate.

C. L. MARLATT,
Sec. Entomological Club
of the A. A. A. S.

WASHINGTON, D. C., June 15th, 1892.

OBITUARY.

DR. CARL AUGUST DOHRN.

Entomologists generally will regret to hear of the death of Dr. C. A. Dohrn, which happened on the fourth of May, in his eighty-sixth year, at his home in Stettin, Germany. Dr. Dohrn was born in 1806, and his youth was passed amid the stirring political events with which this century opened on the continent. He visited the University of Berlin in his sixteenth year with the intention of studying the law, but soon devoted himself to literature and music. His translations of dramas from the Spanish attracted attention, and, as a man of letters and musician, he enjoyed the protection of the late King of Prussia, Frederick William IV. Dr. Dohrn was thrown into the society of many eminent persons, and became the friend of Mendelssohn and Alexander von

Humboldt. His taste for natural history was shown early in life, and he finally devoted himself to the study of the Coleoptera, of which he has left a collection containing many varieties. Dr. Dohrn's literary and descriptional articles upon entomology appeared in the Stettiner Entomologische Zeitung, the organ of the Entomological Society of Stettin, over which he presided for more than a quarter of a century. He was a friend of Zeller, and drew the latter from his pedagogic labours in Meseritz to the scientific circle in Stettin, where he closed his career. It was a custom of Dr. Dohrn to give a New Year's greeting in verse to the readers of the Zeitung. These effusions were both genial and humorous, but, as might be expected, invited criticism, and drew from Lederer, on occasion, a bitter remark. Dr. Dohrn's life in his native city was devoted to many interests, and he was made a member of the legislative body. His son, the well-known professor, is the Director of the Marine Zoological Station in Naples, whom I visited so many years since in Jena. Dr. Dohrn was a man of good presence and engaging manners, and has left behind him many friends in many circles. To the general notice, which his death will thus occasion, I may add my little tribute to his worth. Not so long since he sent me greetings through a traveller, and I was glad to hear of him as still hale and hearty. Everything passes in this world, but one is apt to remember gratefully such personal kindness as Dr. Dohrn extended to me.

Bremen, May 6th, 1892. AUG. R. GROTE.

CORRESPONDENCE.

A CORRECTION.

Dear Sir: In my article on "Insect Monstrosities," in the June number, occur some clerical errors that require immediate correction. In line six of the text, *dele* "and Henshaw, Scudder, and Hagen (Psyche)," and read instead, Scudder (Psyche, VI., pp. 89-93) and Hagen (Memoirs of the Museum of Comp. Zool., II., pp. 5-22). I made a mistake in copying my MSS. for the printer, and made it worse trying to correct it by mail. H. F. WICKHAM.

GASTROPACHA ALUCENSIS.

Dear Sir: With regard to the omission of this species from "Mr. Grote's lists," I would state that I was informed that the entire edition of

the Chicago Academy Transactions, in which the description appeared, was destroyed in the Great Fire, and that Dr. Packard in consequence regarded his paper as unpublished. The species *Leucophæa Neumoegeni*, Hy. Ed., belongs to my genus *Argyrauges*, Can. Ent., XIV., 215, and is in my opinion sufficiently structurally distinct from *Hemileuca Maia* and allies, a genus in which the common pattern and antennal colour and structure show that the forms have become but recently separated and hardened into species, as seems to be the case with *Datana*, and, perhaps, *Clisiocampa* and *Platysamia*. A. R. GROTE.

Dear Sir: I wish on behalf of the Entomological Society of Ontario, to make public acknowledgment of the eminent services rendered to it, and the lasting benefit conferred on the Canadian members of it especially, by Professor C. H. Fernald, who has reviewed the Society's entire collection of Pyralidæ and Crambidæ, at a great expenditure of labour and valuable time to himself, and with no hope of reward, except the consciousness of having performed an enduring work for the advancement of our science. I forwarded to the Professor, at his own suggestion, the Society's drawers containing these insects, and a box of duplicates, that he might see just how they stood in regard to nomenclature. In due time they were returned, preceded by a communication indicating that they had received the closest scrutiny, pointing out errors, and conveying information which enabled me to bring the collection into harmony with his recent revision of these families, as published in Prof. J. B. Smith's "List of Lepidoptera of Boreal America." The most important of the errors corrected, which may have spread from this to other collections, are two: What was under the name *Crambus præfectellus*, Zink., proved to be *C. Leachellus*, Zink., and what was under the name of *C. sericinellus*, Zell., he pronounced to be but rubbed specimens of *C. albellus*, Clem.

The Professor kindly sent to me an example of *C. innotatellus*, Walk., of which *sericinellus* is a synonym, that I might see what it was like; it was a species that I had not seen before, and may not properly belong as yet to our list, and the same is possibly true of *præfectellus*.

We have now a collection in these families which may be pronounced a correct standard for comparison and identification as far as it goes, and the guarantee for its reliability is the work done upon it by Professor Fernald. All our members are cordially invited to make use of it.

J. ALSTON MOFFAT, Curator.

NOTES.

We have much pleasure in recording that on the 20th of April last the Degree of "Doctor Philosophiæ Materialis" was conferred *(honoris causa)* upon Baron Charles Robert Osten Sacken, by the University of Heidelberg. This recognition of an Entomologist who has done such eminent service in North America will, we are sure, be very gratifying to our readers.

Mr. C. H. Tyler Townsend, of the Agricultural College, Las Cruces, New Mexico, has gone on a field trip by wagon to the Grand Canon of the Colorado, in Arizona, and expects to be away till the middle of August.

The Royal Society of Canada held its Annual Meeting in Ottawa on the 31st of May and two following days. The sessions were well attended, and many papers of much value and interest were read. A committee was appointed to investigate the condition and prospects of the marine fisheries of the Dominion. The Rev. Dr. Bethune, President of the Entomological Society of Ontario, was elected a Fellow.

BOOK NOTICE.

THE BRITISH NOCTUÆ AND THEIR VARIETIES, by G. W. Tutt, F. E. S.: Vol. II., London, Swan, Sonnenschein & Co.: 1892.

The second volume of Mr. Tutt's work is equally carefully compiled with the first, already noticed in these pages. It deals with Guenée's "family" *Noctuidæ*, a group in which the varieties of the species are numerous—not always easy to seize or characterize. By relying apparently on the incorrect statements of Butler, Mr. Tutt refers our North American *Agr. turris* and *texana* as varieties of *Agrotis saucia*. The first, as shown by Smith, is probably the *Agr. ochrogaster* of Guenée, whose description was unidentified by me; the second is undoubtedly a distinct species, differing structurally somewhat also, from *saucia*. This volume of Mr. Tutt's is a most useful compilation, showing great industry and the marks of a careful research into the literature of the subject. I can heartily commend it to the attention of specialists.

AUG. R. GROTE.

Mailed July 4th.

The Canadian Entomologist.

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THE FIRST LARVAL OR POST-EMBRYONIC STAGE OF THE PEA AND BEAN WEEVILS

BY C. V. RILEY, WASHINGTON, D. C.

In No. 9–10, Vol. IV., of "Insect Life," an account was given of the post-embryonic larva of the Bean Weevil, attention being called to some most interesting characteristics of this larva, which is possessed of temporary thoracic legs and some other structures which admirably serve its locomotive needs until it has entered the bean, when, with a cast of the skin, they are lost and the larva assumes the ordinary apodous form of weevil larvæ. The Bean Weevil (*Bruchus fabae*, Fitch [Riley],) goes on breeding in stored beans, in which respect it differs from the Pea Weevil, as also in the fact that a number of individuals, owing to their smaller size, will develop in the same bean, as many as twenty-eight having been found in a single bean. The eggs are primarily laid upon the bean-pod in the field but chiefly, if not entirely on those which are already mature and ripening, and the larvæ enter the same very much as does the Pea Weevil. But whether laid upon the pods in the field or laid upon the stored beans, the newly hatched larva has to eat its way into the bean and it is able to move about quite briskly by the aid of these temporary legs. Four rather stout but short spines or spurs on the prothoracic shield and four smaller spurs on the anal plate facilitate the penetration of the smooth and rather thin skin of our ordinary beans. The temporary legs are curious in appearance, consisting of three joints, the second long and slender and doubtless corresponding to the fused femur and tibia. The third, which corresponds to the tarsus, is slender and broadened at the tip into a flat pulvillus bearing at the heel a single delicate spur.

Having recently ascertained these facts upon more careful study of the habits of the Bean Weevil, I was curious to learn whether or not the Pea Weevil (*Bruchus pisi*, Linn.,) had similar structures in its newly-hatched larval condition. It has long been know that the egg of the Pea Weevil is laid on the outside of the pod, being fastened thereto, and the

newly hatched larvæ recently studied show that in this species also we have the same characteristics that I have referred to in the case of the Bean Weevil. The temporary legs are much shorter and stouter, but similarly constructed, the tarsus proper being merely a spatulate pad. The spurs on the prothoracic segment are more elaborate and more conspicuous. They consist of about six strong retrorse spines anteriorly, succeeded by two more prominent plates, also pointing posteriorly and strongly toothed along their exterior border. There are no anal spurs or spines. An interesting fact connected with this larva is that while ordinarily entering the pea direct from the amber-coloured egg, as previously recorded, it sometimes enters the pod in the neighborhood of the egg and then mines along the inside of the pod for some distance, being quite active and moving rapidly and with ease. This doubtless occurs wherever the egg hatches before the peas are sufficiently developed, the larva living as a miner until the pea is nearly full grown. The entrance of the larva into a pea in such case would seem to be rather by chance than design. As in the case of the Bean Weevil, however, the larva molts and loses its legs and other post-embryonic characters as soon as it has penetrated the pea.

SOME NOTES ON THE MARGINED SOLDIER-BEETLE (CHAULIOGNATHUS MARGINATUS).

BY C. V. RILEY, WASHINGTON, D. C.

Since the larval history of this beetle was published by Walsh in 1868 it has been generally known that the larva is carnivorous, feeding, as Walsh showed, upon the Plum Curculio, and, as I showed, on the Apple Worm among other insects, so that it must be included among our beneficial species. The larva is also one of those which is quite often found during the winter months upon the surface of snow. The beetle is one of the most common species during the summer months upon many kinds of flowers, but particularly upon those of Yucca, feeding principally on pollen, but also sipping the slight amount of nectar which is found at the base of the pistil, or the sweetened exudation which is also quite frequent upon the tip of the petiole of the flower after this has dropped. It is quite frequently found in pairs, and there is no difficulty in getting the female to lay her eggs, but so far as I know the eggs have hitherto

been unknown, and no record of them made. It occurred to me, therefore, that a brief statement might be interesting.

The eggs are laid, not in the ground, but on the surface of the ground, and preferably under some shelter, as a stone or a piece of wood. In the vivarium pieces of crockeryware have been made use of. In nature the shade afforded by the dense, more or less recumbent foliage of *Yucca filamentosa* doubtless furnishes a desirable situation. The eggs are laid in clusters, some of them as large as an ordinary pea. They are very pale yellowish, almost white, highly polished and faintly rugose. They are nearly globular, or but very slightly ovoid. I have counted over 300 eggs in a single mass, and each egg measures 0.25 mm. in length and 0.27 in diameter. The newly hatched larva is pure white but otherwise has the same form and general appearance as when full grown.

THE SPECIES OF MAMESTRA.

BY A. R. GROTE, A. M.

By favour of the Secretary of the Smithsonian Institution, I have received a copy of the "Revision of the species of Mamestra by John B. Smith, Professor of Entomology, Rutgers College, Washington, 1891". There are one or two points only upon which I desire here to comment. As a whole the determinations agree with my own. The genus *Dianthoecia* is merged with *Mamestra*, as I at one time proposed from the variability in the same species of the ovipositor. But, as I pointed out in my last Check List, p. 13, the characters of *Dianthoecia*, Bdv., are taken from the habit of the larva, the button-like termination of the wing cases in the chrysalis and the extended ovipositor in the moth. The American forms have been only incompletely studied for these characters. The genus is universally adopted in Europe, and our "cabinet opinions" will doubtless be modified when we come to know the preparatory stages of our species.

So far as the Revision is concerned, I may discuss the following synonymical points. And first, on page 218, my *M. vittula* is very fully described from my type, shown to the author of the Revision by Prof. Snow. Yet, on page 268, this same species is stated to be "unknown", and is further unfavourably commented on as too near to *4-lineata*, while on page 219 the type is said to be "much more nearly allied to *capsularis*

than to *4-lineata*". With reference to *subjuncta*, G. & R., I repeat that Guenée himself determined our type as belonging to an undescribed species, received also by him since the issue of the Species Genéral, and for which he had a collection name which we adopted. It seems thus not likely that the *W-latinum* of the Species Genéral could be our species; but much more likely that it is my *atlantica*. On page 233 *cristifera*, Walk., is preferred for *lubens*, on the faith of Mr. Butler's reference. I have seen none of Mr. Butler's papers. My collection has been distributed without my consent or knowledge, nor have I ever been consulted in the slightest way by the British Museum authorities. I saw the type of *cristifera*, Walk., and it was not *lubens*. As stated by me, and cited in the present Revision, the type of *Acronycta cristifera* is not an *Acronycta*, but a stone-gray Hadenoid form unknown to me. I did not examine the eyes, but I should have suspected them to be naked, not hairy, and the type wanted all the brighter shades of *lubens*, while the markings did not suggest to me *lubens* at all. It seems to me that Mr. Butler is in error. According to the Revision, "the type of *cornis* is a very bright, strongly-marked specimen, like (?) typical *olivacea*, but so spread that the insect appears more plump, shorter winged, and differently marked". As the type was one of the specimens marked to be returned to Mr. Hy. Edwards, and was, with all others, so marked so returned, it is possible that I have been momentarily deceived by the brighter tints and peculiar setting. But I knew *olivacea* well, having originally determined the species for Mr. Morrison as then undescribed. It appears that Prof. Smith had re-described *purpurissata* as a *Hadena*, and that the fusion of the stigmata entitles the retention of this name as varietal.

On page 262 I am credited with a species, *M. dodgei*, which I never described, and which is one of Mr. Morrison's synonyms that I did not refer in my lists, but of which I remember to have had a note. I did not know Mr. Morrison's *ectypa*, nor, from the description, could I have suspected it to be my *bella*, which has a close ally, as I pointed out, in the European *Dianthoecia magnolii*. The author of the Revision has compared the types, and the reference is to be accepted. With the exception of *egens*, I believe I am responsible for the use of Mr. Walker's names in this genus adopted in the Revision. The condition of the specimens representing Mr. Walker's types of *Celaena* was so indifferent that it appeared to me they could not be determined, while the descriptions are quite useless. In the list of species of Mamestra, p. 274, the

errors as to *vittula* and *dodgei* are repeated. I do not find in the list my *M. mimula* (also omitted in my late Check List) nor Dr. Harvey's *D. pallilis*. Hübner's *confusa* and *mucens* are much like *Hylomiges*, and I so referred them in my Check List, 1875–6. Otherwise the species of North American *Mamestra* and *Dianthoecia* known to me seem to be all included in the Revision, which credits me with thirty-three species and two varieties. I would correct this so far that *lubens* should be restored and that *oregonica* should be added as a variety of *trifolii*. Three well-marked species, *sutrina*, *ferrealis* and *Dimmocki*, are unknown to the author of the Revision. The latter should be recognizable since it is a peculiar form, and the type was in my collection, which latter ought rather to have been preserved as I left it, intact, in the true interests of science. What I must have suffered at having my Noctuidæ overhauled by Mr. Butler may be imagined.

MR. WALKER'S TYPES.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the CAN. ENT., p. 136, Prof. Smith says that our reference of *Edema? transversata*, Walk., in 1868, to *lignicolor* is an error. In other cases *e. g. Apantesis radians*, etc., our testimony is borne out, and now comes up the question of a changing in specimens since 1868. Mr. Walker's specimens are not marked type, but placed merely above the label. They can have been changed, and the question is, whether a name of Walker's can be employed which in any way contradicts in its description the supposed species. In my Revised Check List 4, I say: "Clearly there is room for misapprehension of what specimens are really types had we not a check for the reference. This is the criterion for types, that they do not contradict the original description," CAN. ENT., XX., 75. If the description of *Edema? transversata* contradicts *Ellida gelida* in any particular it should not be accepted. If it agrees well with *lignicolor*, our original reference is probably correct. I do not now recall this particular reference, and a possible error in our notes, or their transcriptions, might have occurred. But we knew *lignicolor* very well, and I am the first to restore and interpret this name, reducing *virgata* to a synonym and giving the correct synonymy of the species. I do not object to as rigorous a use of Mr. Walker's names as is consistent with the law of priority. But I object to the putting forward of this or that supposed type of Mr. Walker's without reference to the description. The proposal by Stal and others to

ignore the British Museum Lists from their defective composition has been answered by us, with subsequent American lepidopterists, in the negative. I may say that American lepidopterists have made visits at a considerable sacrifice to London for the main purpose of finding out what Mr. Walker described, and they have always accepted cheerfully the result of these visits. It was necessary to build up in America a stable, specific nomenclature. As to the generic, it will always be unstable, partly from the difference in opinion as to what constitutes a genus, partly that here tradition has been stronger than priority. In vain I have shown that *Jaspidea* is older than *Bryophila*, *Heliophila* than *Leucania*, *Graphiphora* than *Taeniocampa*. At least the acceptance of these names is but partial, and I myself have hesitated to use two of them. The necessity for a stable basis for our specific nomenclature is clearly greater than necessity for ideal justice towards this or that American describer, and he must bear his synonym, as he has to bear other injustice in this world. One word as to the employment of double names in the Noctuidæ, and I have done. It is extremely desirable that no two Noctuids should bear the same specific title. The value of a Check List is largely dependent on the carrying out of this rule. Guenée went so far as to change all double names. In the more than seven hundred species of N. Am. Noctuidæ I have described, I have never used a name twice except by accident. Of late there has been an unnecessary duplication of such names. The coat of ice, which the works of European writers on North American Lepidoptera laid upon our knowledge of the scientific titles of our insects has been broken, and to this freeing of our literature I have assisted to the extent of my ability. A responsibility now rests with future American students that they keep the current clear and take large and philosophical views in their classifications.

OVIPOSITING OF MELITÆA CHALCEDON IN PAPER ENVELOPES.

BY RICHARD E. KUNZE, M. D., NEW YORK, N. Y.

In March number, Vol. XXIV, of CANADIAN ENTOMOLOGIST, Mr. W. G. Wright, of California, mentions a number of genera of diurnals not requiring plants for ovipositing thereon. Those enumerated belong to Parnassius, Argynnis, Euptoieta, Neonympha, Cœnonympha, Hipparchia,

Satyrus, Chionobas, and, in part, Chrysophanus. I can add *Melitæa* to his list, which oviposited on two different occasions under circumstances extraordinary but exactly the same. Two years ago I received from a friend, who collects for me in California, but is not a practical entomologist, a lot of *M. chalcedon* papered up. My instructions to kill specimens with chloroform by brushing a little of it over head of each, and at once paper the same after capture, were carried out to the letter. How much or how little each received I do not know. I received the specimens after being in the mail bag six or seven days on their journey from Oakland to New York. On opening paper box I found a lot of little, hairy, black larvæ crawling over contents of box, and soon traced them to an envelope containing a ♀ *M. chalcedon*, with quite a number which had not yet escaped therefrom. There must have been more than fifty living larvæ, which, not knowing their food-plant, I placed in my garden or back yard, so to speak, scattering the lot over cultivated and wild plants, including a White Birch, in the hope that some might find suitable food, and then watch their progress. But all soon died.

In another envelope I found a second ♀ of *M. chalcedon*, which had laid quite a number of eggs, and which I kept a few days pending development of those living larvæ. When those perished I threw away the ova of *chalcedon*. Both females were found dead in their envelopes. But out of some half a dozen females received I found one alive which had to be put into the cyanide bottle.

Another instance of similar ovipositing was that of a Dioptid, *Phryganidia californica*, received in the same way from the same party two years ago. This was not discovered until I took the specimen in original envelope with a lot of other California specimens to my friend, Mr. Charles Palm, of this city, for identification. Most of the larvæ of *P. californica* appeared to have died during period of hatching or shortly afterward, inasmuch as many were not freed from shell of ovum. A number of ova, but very few out of a total number of fifty-three counted, were not hatched or possibly sterile. I did not discover the dead larvæ of this Californian Bombycid until a few months ago while trying to get it determined.

I should also state that the females of *M. chalcedon*, which oviposited in envelopes, were taken a week apart during a period covering two weeks, and would allow about twenty-one days or less for hatching of ova.

LEPIDOPTERA FROM MARSHALL PASS, COLORADO.

The late Mr. W. S. Foster sent me some years ago a list of Lepidoptera taken by himself in 1888 at Marshall Pass, Colorado, which deserves to be put on record as a contribution to the knowledge of alpine entomology. The collecting was done at altitudes from 10,000 to 13,000 feet, on the slopes of the Continental Divide and Mt. Ouray, on the north side of the railroad track. This is in Saguache county, and about forty miles from the district in Custer county, of which the alpine insects are recorded in CAN. ENTOM., 1890. The list is as follows:—

Papilio zolicaon, Bdv.
" *asterias*, Fabr.
Parnassius smintheus, D. & H.
Pieris sisymbri, Bdv.
" *protodice*, B. & L.
" *oleracea*, Bdv.
Colias meadii, Edw.
" *alexandra*, Edw.
" *scudderii*, Reak.
" *eurytheme*, Bdv.
Argynnis freya, Thunb.
" *eurynome*, Edw.
" *helena*, Edw.
Euptoieta claudia, Cram.
Melitæa brucei, Edw.
" *anicia*, Auctt. Amer.
" *palla*, Bdv.
Pyrameis huntera, Fb.
Cœnonympha ochracea, Edw.
Erebia magdalena, Strk.
Chionobas chryxus, Westw.
" *taygete*, Hbn.?
Lycæna shasta, Edw.
Chrysophanus snowi, Edw.
Lycæna melissa, Edw.
Pyrgus centaureæ, Ramb.
Deilephila lineata, Fb.
Alypia lorquinii, G. & R.
Gnophaela vermiculata, G. & R.
Nemeophila plantaginis, Auctt.
Plusia hochenwarthi, Hoch.
Drasteria erechtea, Cram.
Botis turmalis, Grt.

Mel. brucei is the real *anicia*, and *anicia*, Auctt. Amer., should apparently be called *meglashanii*, concerning which see 12th Rept. Colo. Biol. Assoc. *Nem. plantaginis* of the Colorado Mountains would now, I suppose, be referred to *petrosa*, Walk.

In Prof. J. B. Smith's list of Lepidoptera, while *petrosa* is accepted as distinct, "*hospita*, Schiff." is referred to it as a variety. This latter is, however, a variety of the European *N. plantaginis*, L., and consequently the American *hospita*-like aberration apparently requires a new name. *Botis turmalis* is now referred to *itysalis*, Walk. The doubtful *Chion. taygete* is very possibly the species lately named *C. brucei* by Mr. W. H. Edwards.

Of the thirty-three species enumerated, about half may be regarded as specially alpine; the others occur also at much lower elevations.

T. D. A. COCKERELL.
Institute of Jamaica; Kingston, Jamaica. April 18, 1892.

BIOLOGIC NOTES ON NEW MEXICO INSECTS.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. M.

HEMIPTERA-HETEROPTERA.

All of the following species were determined by Dr. P. L. R. Uhler:—

Lioderma ligata, Stal.

In coitu on mesquite *(P. juliflora)*, July 14. It was found numerous on Chinese cabbage on college farm July 16.

Mozena obtusa, Uhler MS.

Taken in July on *Prosopis juliflora*. *In coitu* July 8.

Chelinidea vittigera, Uhl.

Taken *in coitu* May 24 on a small fruit of *Opuntia*, Soledad Canon.

Hadronema militaris, Uhl.

Swept from alfalfa May 12.

Neurocolpus nubilus, Say.

This capsid was beaten extensively from flowers and foliage of mesquite *(P. juliflora)* May 10. May 12 to 16 both adults and larvæ were beaten. The adults vary from a light yellowish or greenish to brown and almost black, usually more or less mottled. They doubtless grow darker with age. The larvæ are of a clear, light green colour.

Calocoris superbus, Uhler.

This capsid is numerous on alfalfa, both adults and larvæ, and doubtless causes considerable injury to the plant. May 8 to 12 both stages were found in abundance. May 28 the adults were numerous, and a few nymphs were found. The adult is blackish, with orange or yellow on the sides. The larvæ and nymphs are green, with the extremity of the body brown. Predaceous heteroptera and lady-birds were also swept, which doubtless prey upon the capsid.

Calocoris sp.?

Beaten from scrub oak *(Quercus undulatus* var. *Wrightii)* in Soledad Canon May 24. It is very pale yellowish, with faint brownish markings. Oak determined by Mr. W. H. Evans.

Lygus pratensis, Lin. var.

Adults and larvæ swept from alfalfa May 12. Only adults swept May 28. The adults vary from light green or glassy to a uniform light and dark brown, and one specimen has only the posterior portions brown. The larvæ are green with black dots on the thorax, and one black dot in the middle of the first abdominal segment. This species is also, I believe, injurious to the alfalfa.

Rhinacloa forticornis, Reut.

Beaten from scrub oak (*Q. undulatus*, var. *Wrightii*), May 24, in Soledad Canon. It is blackish or brownish, variegated with pale yellowish or silvery. Also beaten, May 28, from alfalfa.

Halticotoma valida, Uhler.

This is a stout looking, short capsid, bluish-black in colour, with the head and thorax reddish-brown. It was found very numerous from May 15 to June 2, on leaves of both *Yucca augustifolia* and *Y. macrocarpa* (?). They do not fly readily, but run down to the base of the leaves and are thus hard to catch. Both adults and young were found, May 15, puncturing the leaves. The larvæ are also bluish-black in colour.

Macrotylus desiccatus, Uhler MS.

Both adults and larvæ of this capsid were found on mesa April 4 infesting plants of *Senecio douglasii*, which they puncture. Both larvæ and adults are greenish. Plant determined by Prof. Wooton.

Tuponia herbacea, Uhler MS.

This small, light green capsid was beaten from mesquite (*P. juliflora*), May 12 to 16. No larvæ were found. On May 28 specimens were swept from alfalfa, which I cannot distinguish from this species.

Tuponia, n. sp.

A single specimen of a bright green capsid with the tips of the hemelytra brown, was beaten from *Larrea mexicana* May 15. It is about 5 mm. long.

Triphleps insidiosus, Say.

Swept in numbers from alfalfa May 12 to 28.

HEMIPTERA-HOMOPTERA.

The following named species, when not otherwise stated, were also determined by Dr. Uhler :—

For notes on several new species, and one new genus of *Coccidæ* see Bulletin No. 7 of the New Mexico Agricultural Experiment Station, June, 1892.

Pemphigus populi-ramulorum, Riley.

This twig gall is found on our cottonwoods (*Populus fremontii*). Green galls were found, June 29, which contained inside small lice with cottony coverings. Winged specimens issued from the gall July 5. Determined by Dr. Riley from galls.

Pachypsylla venusta, O.-S.?

Petiole galls were found at bases of leaves of *Celtis occidentalis*

(hackberry) at Riley's ranch in the Organ Mts., May 14, which exactly resemble those of this species so far as I can determine. The galls were at that date, from one-third to one-half of an inch in diameter; and the eggs were apparently just hatching, or about to hatch. The tree was determined by Mr. W. H. Evans.

Psylla, n. sp. (?)

Adults and larvæ of a psyllid were beaten from mesquite *(P. juliflora)* May 14 to 16. The adults are greenish or yellowish, with brown at the extremity of the wings. The larvæ are entirely green.

Cicada montezuma, Dist.

This cicada was noticed to be very numerous on the mesas and plains from May 23 to 31. They seem to frequent especially the plants of *Yucca angustifolia*. On May 24, while riding on horseback, I was quite sure I observed one specimen with its proboscis thrust into a leaf of this *yucca*. It is very probable that this cicada oviposits in the leaves of this plant, since it seemed to have such a decided preference for it. I am quite sure it also pierces the leaves and stalk for food. The specimen referred to above was motionless, and evidently feeding. A cicada was heard on the mesa May 17. It was either this species or the next, but was not captured.

Cicada ochreoptera, Uhler.

This species was found May 27 on mesa near the college. A pupa skin was also found there. On June 9 it was found very numerous on pear trees, and I was told that in former years it had damaged many of the trees by ovipositing in the twigs quite extensively. I have also found its work on twigs of young plum trees, which had been damaged by it, causing the terminal half of the twigs to die. On Feb. 4 a cicada larva, probably this species, was dug up about the roots of a young apple tree in Mesilla. It was about half an inch long, and was found at a depth of about eight inches. This cicada seems rather confined to the valleys, while the preceding and larger species is only found on the mesas and plains.

Stictopelta marmorata, Goding MS.

This tree-hopper was noticed July 8 on mesquite *(P. juliflora)*, in some numbers. It was also previously noticed on weeds. Determined by Dr. F. W. Goding.

Publilia modesta, Uhler.

Adults beaten in some numbers from flowers and foliage of mesquite

(P. juliflora), May 10 to 12. The hemelytra are yellow, mottled with brown. A specimen swept from alfalfa May 9 is determined by Dr. Uhler, with a query, as this species.

Cyrtolobus annexus, Uhler.

Quite a number of this small brown tree-hopper were beaten from flowers and foliage of *P. juliflora* May 10 to 12. Two larvæ, apparently belonging to this species, were beaten May 10. The larvæ are also brownish.

Stictocephala inermis, Fab.

Quite numerously swept from alfalfa May 9 to 28. The adults vary from wholly green to largely reddish on upper portions. No larvæ found.

Gorgora atlas, Goding.

Adults beaten, May 13 to 15, from twigs and leaves of *Larrea mexicana*. Larvæ were beaten May 15. The adults are of a rich dark brown colour, and peculiar form. The larvæ are greenish. Both adults and larvæ are not readily dislodged from the *Larrea* twigs or leaves, and the adults rarely take wing. This was formerly determined by Dr. Uhler as *Centrodontus biundulatus*, Uhl. (prob. MS.). A specimen was sent to Dr. Goding for insertion of the species in his catalogue, and he wrote me that he had already described it as above, under a new genus.

Typhlocyba vitifex, Fitch.

I notice in Bulletin 19 of the Colorado Station that specimens of the vine leaf-hopper, as it exists in Colorado, have been sent by Professor Gillette to Professor Osborn and Mr. E. P. Van Duzee, who have determined it as *T. vitifex*, Fitch. Our species in New Mexico is apparently the same. I had always noticed the marked difference between this and *T. vitis* in the markings of the hemelytra, but from the fact that many authors accepted these as varieties of one species, I had preferred to consider our form as a variety of the eastern one. Our form does not possess the black spots at base of scutellum, as in var. *coloradoensis*, Gillette. The larva is pale yellowish, with four black spots on the thorax.

Agallia 4-punctata, Prov.

This small, short, grayish leaf-hopper was swept in large numbers from alfalfa May 9 to 28. Larvæ were swept May 12 to 28. *In coitu*, May 28. The larvæ are also grayish.

Gypona angulata, Spang.

Several of this species were swept from alfalfa May 12 to 28. It is

light green in colour, and about 8 mm. long. It probably punctures the alfalfa.

Platymetopius acutus, Say.

Swept from alfalfa May 12. It is small, brownish or grayish in colour, with pointed head.

Oecleus decens, Stal.

Found, May 15 to June 2, on leaves of both *Yucca angustifolia* and *Y. macrocarpa* (?), in which its egg-punctures were very numerous.

THYSANOPTERA.

The following species were determined by Professor H. Osborn :—

Thrips tritici, Fitch.

Swept in great numbers from alfalfa May 12 to 28. It undoubtedly does much harm to the plant. The same species was also beaten in countless numbers from mesquite *(P. juliflora)*, May 16.

Thrips, sp. (?)

On May 5, 1891, some curious cluster-like galls were noticed on our cottonwoods *(Populus fremontii)*. At first they were noticed only on staminate trees, and consisted of clusters of staminate flowers reverting towards a leaf-development. More staminate galls were found on May 7, and also two or three pistillate clusters. On all of these gall-clusters there were present large numbers of an immature thripid, which Professor Osborn says appear to be different from *Thrips tritici*, and possibly belong to a different genus. Whether this thripid has anything to do with these abnormities must be proved by future investigation. It did not seem to be found on the foliage, but was perhaps found on all the flowers.

Coleothrips trifasciata, Fitch.

Swept from alfalfa May 28. Doubtless causes more or less injury, though it was by no means so numerous as *Thrips tritici*.

ORTHOPTERA.

Homeogamia, n. sp. ?

This is a whitish roach which is sometimes attracted to light in the evening, if I remember rightly. It is quite different in appearance from its eastern allies. Determined by Prof. Bruner.

Ceuthophilus pallidus, Thos. (?)

This is a white cricket which was found, June 10 to 27, in houses eating holes in lace curtains and other fabrics. It is reported to cause

much damage in this way. Prof. Bruner writes that it does not quite agree with Thomas's description.

Acridium shoshone, Thos.

For a week or two during the first part of July, I noticed the mesquite *(P. juliflora)* to be greatly infested with this large greenish locust, which was so numerous as to almost defoliate some bushes. On July 14 many nearly leafless bushes were seen, from which, on one's approach, would fly swarms of these locusts.

Melanoplus, sp.

A number of specimens of our ordinary species of Melanoplus were put in a breeding cage with earth June 28 and 29. On July 24 the cage was full of young locusts. The old ones had been transferred to another cage a couple of weeks before. No eggs were taken up with the earth put in the cage, since this was dry sand which had been carefully looked over.

Bootettix argentatus, Bruner.

This locust was found in large numbers on *Larrea mexicana* July 17, 1891, and on no other plant. It is of a beautiful rich green, variegated with velvet-brown, black and silvery-white, and apparently lives only on the *Larrea* on the mesas. Its colour assimilates well with the peculiar green of the *Larrea* leaves. On May 13, 1892, I found on *Larrea* some very small locusts of a general greenish colour, which I am quite sure are the larvæ of this species. The creosote bush is in all probability the food-plant of this locust. Determined by Professor Bruner.

LEPIDOPTERA.

Synchloe crocale, Edw.

The red and black, more or less spiny caterpillars of this butterfly were found, about June 5, on *Helianthus*, sp. They live in colonies. The last of June they were not to be found. Again, on July 28, a good number were found and transferred to a breeding-cage, in which they pupated July 30, suspending themselves from the top of the cage inside as chrysalides. A half dozen imagoes issued August 3. This butterfly is, therefore, two-brooded, and very likely three-brooded. Determined by Mr. W. H. Edwards.

Triptogon modesta, var. *occidentalis*, H. Edw.

A large, light green sphingid larva was found, August 29, on the cottonwood *(Populus fremontii)*. On being placed in jar it immediately went into the earth. The imago of this species issued March 25 following. Determined by Dr. J. B. Smith.

Sannina, sp. (?)

On July 7 a great number of pupa skins of what seemed to be an Ægerian were found sticking out of the ground near roots of mesquite *(P. juliflora)*, on the mesa near college. The perfect insects had all emerged. Digging in the ground failed to disclose any pupæ. I believe this is a sesiid which bores the mesquite roots.

Thyridopteryx, sp.

Our native bag-worm is found here principally on small trees of black locust *(Robinia pseudacacia)*, which have been brought in. It is also found on apple, and I have found its bags on tornillo *(Prosopis pubescens)*. The bags of those on locust are woven on the outside with the leaf-stems of the locust; those on tornillo have the thorns of the tornillo beautifully woven in. A large number of bags cut open, March 15, 1891, revealed only larvæ, which are thick-bodied, brown or black, and an inch or more in length. Through September it was noticed that many of these larvæ, with their cases attached, were crawling on the ground in the vicinity of locust trees. October 5 a large number of these were placed in a breeding cage. They crawled to the top of the cage, and there fastened their bags by spinning a small quantity of silk. In this suspended condition they passed the winter. Nine male moths issued from May 24 to June 1, 1892. The males are of a soft, light, brownish colour, and possess remarkable genitalia. The pupa skins were usually almost entirely extruded from the bag, showing that the pupa works itself nearly out, only retaining its hold by fastening its extremity into the silken lining of the bag near the lower orifice. The adult females may or may not be fertilized in their bags. All the females I have observed were found to have dropped from the bags to the earth of the cage. Some were simply a skin stretched over a mass of eggs, indicating that fertilization had been accomplished, while others showed no such indication. Four females issued from their bags, as well as their pupa skins, May 27 to 31, and were found upon the earth. The female is almost entirely whitish, and grub-like in appearance except the head and genitalia. There are some rings of brownish hair near the posterior extremity of the body. June 9, on cutting open the remaining bags, a live male pupa was found, several larvæ, and an adult female. The latter was dead and contained eggs apparently half formed, as though developed to a certain stage but not fertilized. In one bag, with a dead larva, there was found the puparium of a tachinid parasite with the contents dead and more or less decomposed.

Hemileuca juno, Pack.

On June 15, 1891, a number of large, spiny, warted bombycid larvæ were found on willow *(Salix*, sp.). They were nearly full grown. June 24 to 30, the same larva was found on cottonwood *(Populus fremontii)*.

One changed to a pupa in ground July 6, and another was at that date burrowing in the earth. The two pupæ were sent to Dr. Packard, who wrote me under date of April 20, 1892, that one pupa had disclosed a female moth, which proves to be probably this species. The other pupa was a male and had not yet burst. May 22, 1892, half-grown larvæ, apparently this species, were found on willow. May 31 larger specimens were found on cottonwood *(P. fremontii)*.

Eucaterva variaria, Grote.

This moth was bred from thin net-like cocoons found on terminal shoots of *Chilopsis saligna*, August 25, the moths issuing Aug. 28. The cocoon is very thin, formed of silk, with the nearest leaves fastened to it on the outside. (See *Psyche*, April, 1892.) The moth is silvery, speckled with blackish. I have noticed the *Chilopsis*, through September and October, both near Mt. Picacho and about the entrance to Soledad Canon, to be full of the empty cocoons of this moth. A tachinid was bred from the cocoons about Sept. 5. (See *Psyche*, l. c.) Determined by Dr. Skinner.

HYMENOPTERA.

Andricus, sp. (?).

While looking over, in March, specimens of plants collected the previous summer, Prof. Wooton handed me some scrub oak leaves, one of which possessed on the underside a reddish, woolly, hymenopterous gall. Each section of the gall contained a perfect gall-fly, which had transformed within, but had been unable to escape while the plant was in press. Determined by Dr. Riley. The oak is *Q. undulatus* var. *wrightii;* determined by Mr. W. H. Evans.

Synergus, sp. (?).

Scrub oaks *(Q. undulatus* var. *wrightii)* near Riley's water in the Organ Mts. were found hung full of a large and very hard twig-gall about the size of an apple. From a large gall which was brought home to breed the flies, there issued, from April 6 to 20, about two dozen gall-flies. The gall was 2½ inches in longest diameter, and 2 inches in shortest. It contained twenty-three exit holes April 20. The flies are brown or blackish, with hyaline wings. Determined by Dr. Riley.

Decatoma, sp. (?).

From the last mentioned gall there also issued, on April 20 and May 19, two apparent inquilines of this genus. They are of a brownish flavous colour, and the eyes are of a beautiful light carmine in life. Determined by Dr. Riley.

Chalcididæ (?).

Prof. Wooton handed me in April a pod of a native species of *Lotus*, with some chalcid (?) flies which had issued therefrom in his herbarium. The pod is very small, and the plant was collected the preceding June. The flies are black, and several holes in the pod show where they had issued.

A LIST OF THE BUTTERFLIES FOUND AT MARSHALL, MISSOURI, AND VICINITY.

BY OLIVER J. STALEY.

Marshall is the county seat of Saline county, about twenty miles south of the Missouri River and eighty-nine miles east of Kansas City, and situated among woods and fields; on the west and south open farming country, and on the east and north for three or four miles woods.

I have been collecting here for three years, and believing that a list of butterflies which are found here may be interesting to others I present this list.

By vicinity I mean five miles from town in any direction.

Danais archippus, Fab.

This is about the most common butterfly. I have taken it from April to November. *D. berenice* I have never found here.

Euptoieta claudia, Cram.

Rare; have taken but four or five specimens. Found chiefly in July.

Argynnis cybele, Fabr.

This is the only species of Argynnis which I have found here, and usually it is common, but last year (1891) I only saw one specimen. It is here from April to the middle of October.

Phyciodes nycteis, Db.-Hew.

I have taken a number of specimens, but it cannot be said to be common. They are found here during the summer months.

Phyciodes tharos, Dru.

This species is common from the middle of April to October, and may be taken in almost any numbers.

Grapta interrogationis, Fabr.

Both varieties are very common, but *Umbrosa*, Lint., most so. I have never seen any later in the fall than the last of October, which is the month in which most of our butterflies disappear.

Grapta comma, Harr., var. *Harrisii*, Edw.

One specimen taken in September near Shackleford, about five miles west of here.

Grapta progne, Cram.

This is found all through the summer, but is most common during September.

Vanessa antiopa, Linn.

Very rare ; have seen but three specimens, one in March, one in July and one in November.

Pyrameis atalanta, Linn.

Very common from April to October.

Pyrameis huntera, Fabr.

The least common of its genus but not uncommon, and is found from May to October.

Pyrameis cardui, Linn.

Very common during the same months.

Junonia cœnia, Hbn.

Uncommon, but a few specimens seen every year from July to October.

Limenitis ursula, Fabr.

Not uncommon from May to October.

Limenitis dissippus, Gdt.

Found mostly in August around maple trees ; not uncommon.

Apatura celtis, Bd.-Lec.

Not common and is found in numbers only in a yard in town which has a hackberry tree. August is when most are seen.

Debis portlandia, Fabr.

Common all through the summer months.

Neonympha eurytris, Fabr.

Common from May to September, and is found chiefly near the bottom of gullies which have grassy sides.

Satyrus alope, Fabr., var. *Olympus*, Edw.

Very rare ; have seen but two specimens.

Libythea bachmani, Kirtl.

Usually not uncommon through the summer months.

Thecla melinus, Hbn., var. *Humuli*, Harr.

Very rare ; have taken but one specimen.

Feniseca tarquinius, Fabr.

Very rare ; took one specimen, somewhat broken, in an opening in the woods in September.

Chrysophanus thoe, Bd.-Lec.

Rare ; a few specimens were captured by a friend west of Marshall in September.

Lycæna pseudargiolus, Bd.-Lec.

The form Pseudargiolus is very rare; found mostly in July and August.

Var. *Violacea*, Edw.

This form is common and seems to be found at all times through the spring and summer.

Var. *Neglecta*, Edw.

This also is common and most so during the summer months.

Lycæna comyntas, Gdt.

Common, and is found as late as October.

Lycæna isola, Reak. or *Alce.*, Edw.

I have taken a few specimens but only in October; have not seen anything of them at any other time.

Pieris protodice, Bd.-Lec.

Common through the summer.

Pieris rapæ, Linn.

Too common from April to October.

Nathalis iole, Bdv.

Rare; found only in September.

Colias eurytheme, Bdv.

Very common, from April to November; have taken a few Albinos of this species in October.

Var. *Keewaydin*, Edw.

Not uncommon; a few taken in August, but most in latter part of September and October.

Colias philodice, Gdt.

This is our most common butterfly, and is found from early in April to middle of November. It is more common than *C. eurytheme.*

Colias caesonia, Stoll.

Common through summer months.

Terias nicippe, Cram.

Rare; have taken but one specimen, but that was perfectly fresh; October.

Terias lisa, Bd.-Lec.

Common, but most so in September and October. Have taken white females of this species.

Papilio ajax, Linn.

Not uncommon in variety *marcellus*, Bdv., but *telamonides* is rare. This species I found very hard to capture on account of the colour and the skill they have in dodging the stroke of the net.

Papilio turnus, Linn.
Common all through the summer.

Papilio cresphontes, Cram.
Common from April to September.

Papilio asterias, Fabr.
Common through the summer.

Papilo troilus, Linn.
From April to October may be seen; not very common at any time.

Papilio philenor, Linn.
Common; found from April to middle of October.

Ancyloxypha numitor, Fabr.
Not uncommon in the fall.

Pamphila zabulon, Bd.-Lec.
Common.

Pamphila huron, Edw.
Have taken a few specimens in October.

Pamphila peckius, Kirby.
Common in latter part of summer.

Pamphila cernes, Edw.
Common; most so of its genus; found all through summer and fall.

Pamphila verna, Edw.
Nearly as common as "*cernes*", and found with that species.

Pyrgus tessellata, Scud.
Common in October—not very much before.

Nisoniades juvenalis, Fabr.
Common on flowers in September; seen occasionally during the summer.

Pholisora catullus, Fabr.
Not uncommon; found principally on flowers.

Eudamus bathyllus, S. & A.
Rare. I have only found this east of Marshall, along the C. & A. R. R., and only in October.

Eudamus tityrus, Fabr.
Common all through summer.

Paphia troglodyta, Fabr.
Not uncommon; mostly seen in September, and delights in resting on dead brush, where it may be easily taken.

Callidryas sennæ, Linn.
Rare through summer, and very hard to capture; but in latter part of September is common, and while resting on flowers may be taken with the thumb and finger.

Mailed Aug. 2nd.

The Canadian Entomologist.

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FOURTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The fourth annual meeting was held in the University building, Rochester, N. Y., on Monday and Tuesday, August 15th and 16th, the President, Dr. J. A. Lintner, of Albany, N. Y., occupied the chair and Prof. F. M. Webster, of Wooster, Ohio, filled the office of Secretary. The following members were also present:—C. V. Riley and L. O. Howard, Washington, D. C.; D. S. Kellicott, Ohio; John B. Smith, New Jersey; E. B. Southwick, New York; H. E. Weed, Mississippi; M. V. Slingerland, New York; H. Osborn, Iowa; J. Fletcher and C. J. S. Bethune, Ontario; C. H. Perkins, Vermont; P. H. Rolfs, Florida; S. A. Forbes, Illinois.

Owing to the ill-health of the President, the annual address was delivered by the Vice-President, Prof. Forbes, in which he treated especially of the work that has recently been done on the contagious diseases of insects, and the satisfactory results that have thus far been obtained. He also referred to the successful importation of several insect parasites, and drew the attention of the meeting to the desirability and importance of studying the aquatic insects of America and their relations to fish culture. This able and highly interesting address was subsequently reported upon by a special committee who warmly commended it, and urged upon the attention of economic entomologists the recommendations in regard to "Aquatic Entomology" and its bearings upon fish culture.

Prof. Kellicott read a paper upon "Hypoderus Columbæ", a mite which is parasitic upon pigeons.

A paper by Mr. C. H. Tyler Townsend was read on "The possible and actual influence of irrigation on insect injury in New Mexico", in which he showed that in that region of the country irrigation may be made to exert a valuable influence as an adjunct to the proper use of arsenites and kerosene.

Prof. Kellicott read "Notes on Ægeriadæ of Central Ohio, No. II.", which is published in full.

Prof. Smith said that adults of the Squash borer, *M. ceto*, from last year's larvæ were now flying on Long Island, and that all stages of the insect might be obtained in the same field. The moths gather in the evening on the upper sides of the leaves, and are collected in great numbers by the farmers. Messrs. Forbes, Slingerland and Smith stated that in their experience the Ægerians were not attracted by electric light.

A paper on "The Bean Weevil, *Bruchus obsoletus*", was read by Mr. V. Slingerland, in which he described the mode of ovipositing, and gave a brief account of the life history of the insect. He stated that bisulphide of carbon will destroy the insect in all stages. He also read a paper on "*Drasteria erechtea*", in which he stated that in 1889 over two thousand specimens were taken by means of trap lanterns at Ithaca, N. Y. Last year he bred a number of specimens, and as a result of the study of the material thus obtained, together with about three hundred specimens sent him from all sections of the country, he came to the conclusion that there are two species, about equally common, included under the name *erechtea*, and that these should be called *D. erechtea*, Cram., and *D. crassiuscula*, Haworth, with *ochrea* and *distincta* as varieties of the latter. He then proceeded to describe the differences between the species, and recommended the plowing of infested fields in order to destroy the larvæ and pupæ

A paper by Mr. T. D. A. Cockerell, of Kingston, Jamaica, on "*Orthezia insignis* as a garden pest", was read by the Secretary. The writer stated that the insect was first observed on a variety of exotic plants in the hot houses at Kew and elsewhere, and that he now found it injurious to several garden plants in Jamaica.

A paper by Dr. F. W. Goding on "The Food Plants of North American Membracidæ" was next read. This was followed by Prof. J. B. Smith's paper: "Notes of the Year in New Jersey", in which he referred to the principal insect attacks that had come under his notice. In the discussion that followed remarks were made by Mr. L. O. Howard, Prof. H. Osborn, Dr. Lintner, and Prof. F. M. Webster.

Mr. Webster drew attention to the occurrence of *Phytonomus punctatus* to an injurious extent in North Eastern Ohio, and of *Hylastes trifolii*

attacking peas in Northern Ohio. He stated further that *Otiorhyncus ovatus* was found feeding upon the foliage of musk melons.

A paper on "Two Serious Pear-tree Pests" was read by M. V. Slingerland, of Cornell University.

1 The Pear-tree Psylla *(Psylla pyricola)*.—This insect is described as one of the most serious pests that pear growers have to fear. It had appeared in the valley of the Hudson in enormous numbers during 1891, orchards which had given promise of 1,200 barrels of fruit having perfected less than one hundred barrels. The Pear-tree Psylla, when mature, is scarcely 3 mm. in length, and shaped like a miniature Cicada. The nymphs are oval and very flat, and produce a great deal of honey-dew, which renders the trees unsightly. There are three and perhaps four broods in the year, and it is in the perfect state that the insect hibernates. As a remedy Mr. Slingerland had found that the nymphs were easily destroyed by a very weak kerosene emulsion (two per cent.) Washing the trees in winter to destroy the adults was also recommended.

2. The Pear-leaf Blister mite *(Phytoptus pyri)*, was alarmingly on the increase in the United States and Canada. It is a very small mite, which hibernates beneath the bud scales of the pear tree, and comes out when the leaves expand in spring and forms blister-like galls on the foliage. Spraying the trees during the winter with kerosene emulsion had been found successful.

Prof. Lintner stated that *P. pyri* was very abundant in Eastern New York.

Prof. F. M. Webster had also found it abundant in Ohio. Spraying with Bordeaux mixture had shown no effects in reducing the leaf-blisters.

Prof. J. B. Smith had found that in orchards sprayed with the ammoniacal solution of carbonate of copper, mixed with London purple, the pest was perceptibly lessened.

Mr. Southwick read a paper upon *Depressaria heracleana*, the Parsnip web worm, and gave an interesting account of the war waged upon it by the "Potter Wasp", *Eumenes fraterna*, and stated that he had bred from it a Hymenopterous parasite, a species of *Limneria*.

Mr. Howard read a paper, "An Experiment against Mosquitoes," which was listened to with great interest. A small quantity of coal oil was distributed over the surface of a small mountain lake, and enormous numbers of the larvæ and perfect insects were destroyed.

Interesting notes of the year were read from Mississippi by Prof. Howard Evarts Weed.

With regard to the Horn Fly, Prof. Smith stated that it was not more abundant in New Jersey than the ordinary cattle fly *(Stomoxys calcitrans)*.

Prof. Kellicott said that his son had found it very abundant in Central Michigan.

Mr. Weed thought that dark coloured cattle were most subject to attack. He also recorded that the insect now occured in Louisiana.

Dr. Bethune stated that the Horn Fly had this month been noticed for the first time in the Province of Ontario at Oshawa, Toronto and London, and was creating some alarm among stock owners.

Mr. P. H. Rolfs had found the Horn Fly in Florida.

Mr. Osborn read Notes on Injurious Insects in Iowa. For want of time the discussion on this interesting paper was deferred.

Prof. C. V. Riley read a paper on Rose Saw-flies, in which it was shown that there were three distinct species attacking roses.

AFTERNOON SESSION.

On reassembling the following members were elected:—Prof. P. H. Rolfs, of Florida; Mr. H. A. Gossard, of Iowa, and Mr. C. F. Baker, of Colorado.

A paper on Plant Faunæ by Mr. T. D. A. Cockerell, of Kingston, Jamaica, was read.

Mr. James Fletcher read a paper on Injurious Insects of the year in Canada. This gave rise to a long and interesting discussion on several points brought up in the paper, particularly with regard to the life history of *Gortyna immanis*, the different kinds of Knapsack sprayers, and the most practical remedies for the Horn Fly.

Prof. Webster read a paper on the Aphidivorous Habits of the Common Slug *(Limax campestris)*, which was discussed by Messrs. Riley, Smith and Howard.

Dr. Bethune had found slugs upon trees he had sugared for moths.

The following officers were elected for the ensuing year:—President, Prof. S. A. Forbes, of Illinois; 1st Vice-President, Dr. C. J. S. Bethune, of Canada; 2nd Vice-President, Dr. J. B. Smith, of New Jersey; Secretary, Prof. H. Garman, of Kentucky.

The meeting then adjourned.

NOTES ON AEGERIADÆ OF CENTRAL OHIO—II.

BY D. S. KELLICOTT, COLUMBUS, OHIO.

The first collection of notes on the Aegeriadæ of Central Ohio was published in the current volume of the CANADIAN ENTOMOLOGIST. Since the former notes left my hands additional observations have been made, and a few more species collected. Inasmuch as I shall have something to say of the destructive habits of the larvæ of these species, this seems to be the appropriate place to present these notes.

Melittia ceto, West.—Concerning this species, in view of the facts cited, I said in the former paper, "It seems in view of the facts at hand that in Central Ohio and South it is double brooded." In the May number of the CANADIAN ENTOMOLOGIST, Prof. J. B. Smith has an interesting note throwing light upon this question. His quotation from the MS drawings by Abbott clearly proves that in Georgia it has two annual broods He also cites the facts of his own observations in New Jersey, and expresses his disagreement with my inference for the latitude of Central Ohio. He may be right; I am simply waiting to see. I still think there is something in its life-history not yet explained.

Larvæ put into breeding cages in September last gave imagos in May and June. Larvæ were found destroying the squash plants early in July; by the 15th to 20th I transferred the plants to breeding cages, with larvæ of different sizes. These shall be carefully watched, and the result reported.*

Sciapteron tricincta, Harris.—This species was reared by me several years since at Buffalo, N.Y., from enlargements of the branches and stems of *Populus candicans* and *Salix* caused by the larvæ of *Saperda moesta* and *Saperda concolor*. The present season I have found it at Columbus, with similar habits, in the stems of the willow injured and enlarged

*NOTE, AUG. 8.—By August 1st a few larvæ had left the stems and entered the ground; by the 8th, the day of last examination, many had done so. Small ones are comparatively few. Among the smaller ones there was an abundance of that second form described by Prof. Scudder, in Psyche, Vol IV., p. 303. Some of these were isolated, and after a few days they moulted, giving the typical form. This seems to prove that there is but one species. It may be interesting to note that these larvæ will feed in the stems and roots of *Echinocystis lobata*; also in the fruit of the musk melon. I have not watched them to maturity in either.

NOTE 2, AUGUST 26.—On my return to Columbus, August 25, I found that three examples of the imago had emerged in the vivarium from the larvæ placed therein between July 15 and August 1. My son had noted the dates of appearance, as follows:—One each on the 20th, 21st and 23rd; to-day a fourth emerged, and three fresh ones were captured in the field. These facts I consider sufficient to prove that in Central Ohio there may be a second brood.

by the larva of *S. concolor*. The beetles appeared from the middle of May to the middle of June; the female gnaws deeply through the bark into the wood, generally near a branch, and places an egg at the bottom of each pit; the larva is soon burrowing under the bark and into the wood; there are often several at the same point. The Aegerians appear later in June and July and place their eggs in the excrescenses caused by the boring young of the beetle. I have not yet found instances in which it was clearly apparent that the young Sciapteron had made its own way into uninjured stems. This fine moth is seldom seen on the wing, but is easily obtained by gathering the stems infested by *Saperda* in May and keeping them moist for a few weeks.

Aegeria corni, Hy. Edw.—The trunks of the maples at Columbus are greatly disfigured by the larvæ of *Aegeria acerni*. The branches also suffer to a large extent by the action of another aegerid infesting them. The former pest is confined almost wholly to the trunks of shade trees; the latter occurs in both shade and forest trees—most numerously in the latter or perhaps in isolated trees in the fields.

The branches ranging from mere twigs to those an inch or two in diameter are found much enlarged, often at several different points, into rough barked and gnarled excrescences; these are often nearly globular, more often, however, oblong, and frequently there are openings into the centre of the stem. On cutting into the wood it is found to be mined in various directions and decaying; this often causes the branch to die or so weakens it that the winds throw it down. There may be one or more larvæ in a single excrescence.

The mature larvæ are 12 to 15 mm. long; body slender, white; the skin is transversely folded, especially in the thoracic rings, and there is a strong longitudinal substigmatal fold. The head is smooth, pale brown, with the anterior edge of the clypeus, labium and mandibles black; the thoracic shield smooth, broad and colourless; feet pale yellow; stigmata small, round, pale yellow; piliferous spots scarcely perceptible; fine, short hairs chestnut.

The larva changes to pupa in a thick, gummy cocoon, strengthened exteriorly by bits of wood and placed in cells just under the bark, with a thin shell remaining to be broken up by the pupa at the final change, the pupa skin remaining protruded.

The pupa measures 10 mm., slender, light brown, with the usual transverse denticles on the dorsal abdominal segments and a circle of

stouter teeth about the abdominal tip ; the clypeus is armed with spine or tooth.

The moths issued this year from May 11 to July 15. It is a pretty species, the sexes differing somewhat in appearance, the female being easily mistaken for that of *acerni*, although smaller.

The male expands 17 mm.; the colour deep black with some metallic scales ; the narrow clothed margins of the wings and heavy discal bar deeper than the apical patch which is more bronze-brown ; fringes concolorous except the anterior third of inner margin which is yellow. Clypeus with white lateral lines ; palpi light orange except the blackish third joint and outer side of second apically ; collar same colour as palpi ; antennæ black, slightly washed with white on outer edge of apical third. The thorax yellow below, black above, with long golden cilia about the insertion of the wings. Abdomen black above, same below, with more or less of golden scales running up on the sides at edges of rings, and on fourth ring giving a narrow band, in some seen faintly on other dorsal rings. Anal tuft ample, black above and laterally at base, below deep reddish orange. Claspers yellow. Legs : coxæ golden, other joints black outwardly, golden inwardly to claws, last pair with middle of tibia and tips of tasal joints ringed with golden ; the inner side of fore tibiæ is light orange ; spurs concolorous with the golden yellow legs.

The female expands 20 mm. General colour the same as male, but differs in having less black at tips of palpi, in having much more golden beneath abdomen, in having the same extending over dorsum so that nearly all the rings are faintly edged. and the fourth with a broad band, and in having no black in the ample caudal tuft which is deep reddish-orange.

I have compared the moth with Henry Edwards's description of *Aegeria* and conclude it is his *Aegeria corni*, although one cannot be positive without comparing the type. He had before him only one male taken in Purgatory Swamp, Mass., and the description is not all that could be wished. My specimens differ slightly from the description and vary considerably, frequently more than some of Mr. Edwards's species differ from one another. I will point out some differences which it seems to me are easily reconciled. He gives expanse of *corni* 15 mm.; the smallest of mine (males) is 15 mm., the largest 18 mm., average 17 mm. He says, " No bands." Some of mine are scarcely banded after storage in the cabinet a month. He says " spurs light orange." In mine they are not, the only real difference between his descriptions and my moths.

Before our next annual meeting I shall try to compare my moths with the type, and shall take pleasure in reporting the results.

Is the moth an inquiline? It would seem so, yet after much searching I have found only one beetle borer that would probably serve as a forerunner ; this was found in an excrescence of *Acer dasycarpum*. The Aegerian is far more abundant in *Acer saccharinum*.

Aegeria rubristigma, n. s.—Whilst searching in excrescences on the oak for examples of *Aegeria gallivora*, I came upon the present species,

which is less common than *gallivora;* it is a perfectly distinct species and apparently undescribed ; hence I propose to describe it under the name given above. One male and one female obtained. Female.—Forewings purple black, with red scales between the veins and the square stigma at end of cell red ; borders of hindwings very narrow, costa reddish ; fringes ample, black, yellow at basal third of inner margin of hind pair ; beneath forewings yellow to stigma. which is deep orange, beyond the borders and veins black with reddish between ; hindwings with costa yellow, also anterior third of inner margin. Head all blue-black, with milk-white lines before the eyes ; collar yellow ; palpi with basal joint black, second black except the front margin, which is yellow, as is the whole of the third joint ; the antennæ are wholly black, except the under side of the basal ring which is yellow. Thorax uniform blue-black, with colour extending upon the base of wings ; metathorax golden yellow ; beneath colour as above, with a light yellow almost white spot under the insertion of the wings. Abdomen concolorous with thorax above and below ; the second segment has a narrow dorsal band, the fourth a wide one, extending entirely around the body, and the last a narrow band all golden-yellow ; tuft at end of abdomen concolorous above and below with a line of yellow hairs laterally. Legs blue-black, varied as follows : Fore-coxæ outwardly, fore-tibiæ, all the tarsi, the spurs and a band at the middle and apex of the hind tibiæ yellow ; the tarsi, however, have some dark, scales sometimes appearing faintly banded.

The male agrees with the foregoing except that the abdominal bands are less distinct and the yellow in the caudal is wanting.

Expands 17 mm.

Obtained from Cynips gall on twigs of *Quercus palustris*, collected by my friend, F. E. Bogue, at Sugar Grove, Ohio, and by myself at Central College, Ohio. One imago appeared June 10 and one July 15.

The pupa has the usual form, length 12 mm., armed, clypeal spine flattened to a cutting edge apically ; there is a median ridge on the dorsum of mesothorax and on either side of it a parallel grove.

The pupa cell is excavated in the pithy substance of the gall and lined with silk.

This moth should be compared sufficiently for separation with other species from Quercus galls. It differs from *Hospes* and *Gallivora* as follows: Front blue-black, whilst they have front white : legs black ; they have legs yellow : palpi black and yellow ; they all yellow with mere tip black. *Rubristigma* has red bar ; they black. Compared with *Aegeria querci* from galls on live oak it is twice as large. *Querci* has lemon-yellow lines on side of thorax, antennæ brown, yellowish beneath ; has nearly all the abdominal rings with bands costa lemon-yellow beneath, leg-joints whitish, pectus lemon-yellow ; in all these points *Rubristigma* differs decidedly. The differences are also as striking with *Nicotianæ*, with which Henry Edwards compared *Querci*, a species having a fiery-red discal mark.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE—ANNUAL ADDRESS OF THE PRESIDENT.

BY E. A. SCHWARZ.

At the Ann Arbor meeting of our Club, in the year 1885, Prof. John B. Smith proposed as a subject of discussion "How shall we create and foster an interest in the study of Entomology?" In the discussion a rather gloomy view was then generally taken by the members regarding the general lack of interest in entomology in this country, Prof. Riley alone expressing himself hopefully as to the future outlook. As the best means for creating such interest the production of a *popular* compendium of North American insects was recommended, but the discussion only dwelt upon the difficulties in the way of producing a popular and yet valuable work.

Now, no one can deny that within the few years that have elapsed since 1885 a great change has taken place, a change which has been alluded to by others, and among them by Prof. A. J. Cook in his presidential address delivered at the Indianapolis meeting of this Club in 1890. Many new and conscientious workers in the various branches of both pure and applied entomology have appeared; orders or families of insects hitherto sadly neglected have found competent students; the life histories and earlier stages of a multitude of insects have been studied and recorded with a thoroughness and exactitude previously rarely attained; entomological instruction, both of a scientific and practical nature, is now given by competent teachers in many colleges; the increase in popular interest in entomology is manifested in the many collections that have recently been formed by young beginners; and, finally, even the newspapers have ceased to make fun of "bug catchers." In short, the combined work of our entomologists from the time of Say and Harris down to our day begins to bear fruit, and has enforced for entomology that recognition among the other sciences which her importance demands.

An excellent illustration of this change can be found in the records of last year's meeting of our Club, held at Washington. In his admirable address as president of the Club, Prof. Herbert Osborn again proposed the production of a Manual of North American Entomology, but this time not of a popular one to create and foster an interest in the study of entomology, but of a scientific compendium for the use of the advanced

student, a work which should embody in a conveniently condensed form all those contributions to general, to systematic or to biologic entomology, which in their totality represent the present state of knowledge of North American insects, and which are now so sadly scattered through the literature. The members of the Club then present greeted the project with applause; no gloomy views regarding its practicability were heard, the only serious objections made being of a business nature. A committee was appointed, which in due time submitted a favourable report. For want of time this report could not be discussed last year, but the committee was instructed to submit a "well-digested scheme one year hence", and I sincerely hope that the proceedings of our present meeting will contribute toward an early realization of this important plan. For my own part I subscribe to every word that has been said in its favour by Prof. Osborn in his address, and by other members during its preliminary discussion. Many of us will have given attention to this subject during the past year, each in his own specialty, as I have myself. And I have more particularly considered in my own thoughts how the collated and combined work hitherto accomplished in North American coleopterology will compare with a certain manual on European Coleoptera, which has done eminent service, and to which I shall refer later.

It is generally supposed that North American coleopterology is in a better, *i. e.*, more advanced state to be represented in a compendium, than most other orders, and upon reflection I find this to be the case in some respects, but not so in others. On this subject I have noted down some remarks which I beg leave to present herewith in a condensed form.

In order to study insects we must first collect them, and I have, therefore, to devote a few words to the state of exploration of our country. The history of the entomological exploration of North America has many interesting points which are not generally known, but I cannot possibly review the whole subject, and shall confine myself to the progress made since the foundation of this Club in 1874. The older members of our Club will remember that at that time, or a little previously, Coleoptera from California or even Colorado were to be found only in a few cabinets; to-day the Coleopterous fauna of the Pacific Slope, Colorado, Kansas and some other Western States are in many of our Eastern collections by far better represented than those of Georgia or Maine. The completion of the Southern Pacific Railroad opened for easy exploration a vast extent of territory previously but imperfectly known; coleopterists

have not been slow to avail themselves of this opportunity, and an unexpectedly large number of hitherto unknown species have been brought from that region, especially from Arizona. Skilled field coleopterists have been over the lines of all other transcontinental railroads constructed since 1874, including the Canadian Pacific Railroad (opened in 1886), and over most of their branches. In short, the whole country lying west of the Rocky Mountains and east of the Sierra Nevada may be said now to be explored as well as can be expected by entomological travellers or expeditions. This exploration is necessarily more or less superficial, a mere skimming of the surface. What is needed for the region mentioned is the presence of a number of active *resident* specialists; for even the most expert collector is unable during a few weeks' excursion to thoroughly explore even a very small area. He cannot acquire that local knowledge which is necessary to a thorough investigation; he has but little chance for making biological observations, and he cannot possibly keep track of the species appearing in the different seasons of the year. What can be accomplished by the work of resident specialists has been shown of recent years in California, and, thanks to their labours, the fauna of that State is now as thoroughly known as that of Pennsylvania or Virginia.

There is something else needed for the West, viz., a *speedy* exploration wherever possible of those sections where the native flora and fauna are still intact from the inroads of civilization. Faunas and floras of small islands have within the memory of a single generation undergone great changes; native species have disappeared and cosmopolitan species have taken their place. The island of St. Helena is a familiar and often quoted example of this influence of human cultivation, and not long ago one of our botanists complained of the inevitable extermination in the near future of some of the plants peculiar to one of the most interesting faunal regions of the West, viz., the islands off the coast of California. This influence of man not only produces changes on islands of smaller or larger extent, but also affects, though in a much slower way, larger faunal regions. In 1891 I had, in the company of Mr. H. G. Hubbard, an opportunity to visit the more readily accessible parts of the Wasatch Mountains of Utah, and a few days' exploration convinced me that the aboriginal fauna of that range must have been quite different from what we found. This range, once covered with a magnificent coniferous forest, has now been more or less completely denuded in consequence of

mining operations; whole mountain sides are now kept bare of any vegetation whatever by snow slides. In the more sheltered portions and on the plateaus a scanty growth of deciduous trees and shrubbery has replaced the conifers; thousands of sheep, which are driven through the canyons up the mountain, make annually a complete sweep of the alpine and subalpine lower plants. It is no wonder under these circumstances that species peculiar to these mountains are now but few in number and rare in specimens, and that there is an undue proportion of species which are evidently immigrants from other regions. Along the base of the mountains irrigation and cultivation have effected a still more radical change and utterly exterminated the native flora and fauna. Even along the old water courses within the irrigated districts the insects have disappeared. Similar conditions prevail all over the West; in the Southwest irrigation and sheep, and in the Northwest the axe of the lumberman, and forest fires are hard and fast at work destroying the original flora and fauna. Of course, there are in the West many square miles of virgin ground left, but if we are desirous of preserving a record of the original fauna, there is need, as I said, of a speedy exploration.

There is still very little known of the Coleopterous fauna of Lower California and more especially of the tropical part of this peninsula. How large a proportion of the Coleoptera of Alaska has been described, or is at least available for study in our cabinets I do not know, but judging from the fact that the Swedish Vega expedition brought home from the northwest coast quite a number of species previously unknown, I presume that much still remains to be investigated in the western part of Alaska and in the interior.

In the country east of the Rocky Mountains the progress of exploration has of course been much more thorough than in the newer west. Since the formation of this Club the faunas of Texas and Florida, hitherto but imperfectly known, have yielded a large number of new forms; the White Mountains of New Hampshire have been very carefully explored, and this mountain range is the only one in North America which may be said to be thoroughly investigated, not only in regard to Coleoptera, but also some other orders. Besides this a large amount of very careful collecting has been done at many points within the Northern, Middle and Western States with a thoroughness which was utterly unknown to the coleopterists of thirty years ago, and which has, I fear, resulted, in some instances, in the extermination of a few choice species. At any rate, it

gives us for the first time a correct idea of the fauna of many restricted localities. The results of the most careful local investigations are not recorded; it may be of interest, therefore, to learn that the Coleopterous fauna of what, in my opinion, is the best explored point in North America, viz., the District of Columbia, amounts to upward of 3,200 species.

The absence of resident coleopterists in a large portion of the South, and more especially in Georgia, Alabama, Louisiana, and Arkansas is sorely felt; the high mountains of North Carolina have never been explored coleopterologically; only a small portion of the semitropical region of Florida has been visited by coleopterists; and what little we know of the Coleoptera from the extreme northwest is due to the exertions of European entomologists. A recent Danish writer informs us that twenty-five species is the total of what is known of the Coleopterous fauna of Greenland!

To sum up: I fully believe that if the material of North American Coleoptera now scattered in many collections could be concentrated we would have a very fair representation of our fauna, and this not only in the larger and more conspicuous species, but also in the previously neglected Microcoleoptera even of those groups which have not yet been worked up.

I may add that, thanks to the example and advice given by a few coleopterists, specimens in collections are now generally much more carefully mounted, and, therefore, more readily available for study than was the case some twenty years ago. The old reproach that specimens from American collections are poorly mounted or pinned, and generally in a miserable state of preservation has no longer any force. On the other hand the importance of a more exact and more scientific mode of labelling is slowly becoming recognized by our coleopterists, and still disregarded in some collections which would otherwise possess high scientific value. Improvement and progress in this respect are, however, visible of late years.

That the classification of the North American Coleoptera is more advanced and in a more satisfactory condition than that of any of the other large orders, is almost wholly due to the genius of two men. It was Dr. Leconte who at an early period of his studies recognized that our Coleoptera had to be treated in a monographic or synoptic way, based upon studies independent of the classification of the European fauna. What he accomplished during his lifetime has been ably set forth by

others more competent than I His work has been taken up and continued in a masterly way by Dr. Horn, whose numerous contributions to coleopterology during the past twenty-two years are in every respect models of monographic treatment. That his work has not only advanced the knowledge of North American Coleoptera more than the combined work of all previous authors, but also that it has contributed largely to the classification of Coleoptera in general, is universally acknowledged, and I need not dwell here on this point. But what I desire to emphasize here is the eminent practical usefulness of Dr. Horn's descriptive work. There are hundreds of other valuable monographs on Coleoptera and other orders, not to speak of the almost countless descriptions of isolated genera or species. In studying these, how often is the need or necessity felt, even by the most experienced and painstaking student, of examining what is known as the type of the author in order to obtain clearness in regard to a species or genus. In fact a considerable proportion of our more recent entomological literature is filled with the discussion of types and with the results of examinations of typical specimens, not only those of the older, but also of recent authors. Costly journeys to places where types are preserved are the order of the day, and even the finding of such types in a large museum has developed into a science. It would appear, indeed, as if the types were everything, and the published descriptions only of secondary, or of no value whatever. Now, what I mean with regard to the practical usefulness of Dr. Horn's descriptive work is that here this element of uncertainty and ambiguity is eliminated. With admirable acumen and tact characters of structural nature, which are readily understood and unmistakable to the student are here grasped, their relative importance recognized and set forth in the descriptions in a concise way, so as to leave no room for doubt. The types of Dr. Horn's work are not the frail and perishable specimens in his cabinet, but his published descriptions, which cannot be destroyed by museum pest or fire, and which have become the common property of entomological science.

The number of other American contributors to systematic coleopterology has considerably increased since the time our Club was organized, and some work of an excellent character has been produced, but also some work which, for one reason or another, has not always marked a real advance in the knowledge of the family or group treated. Whoever thinks that a useful monograph or synopsis of a family or even of a large

genus of Coleoptera can be produced after one or two weeks' study is greatly mistaken, and should not be astonished that his work is accepted with distrust and disfavour on the part of the working coleopterists. But carelessness and superficiality are by no means always the cause of adverse criticism. There are some contributions to systematic coleopterology written with evident and painstaking care and after much study, and containing many valuable observations on classification. Still their value is greatly impaired by a singular defect. Excessive, and, in my humble opinion, unnecessary, multiplication of genera, now the fashion of the day, is no serious drawback to the study of insects. Genera do not exist in nature, their erection is a mere matter of tact and experience, and they can be rejected or accepted by the working entomologist provided that the components of genera, viz., the species, are known. The species is the unit and the element upon which our classification is based, and whatever difficulty or impossibility there is in the definition of the term "species" from the modern scientific standpoint, there is certainly an easy explanation from the practical standpoint. A species is what the consent of the most experieneed specialists considers as such. I am well aware that in many instances such consent cannot be obtained, yet there are comparatively few genera in our fauna where there is dispute or uncertainty regarding specific limits. If this appreciation of what should be considered as a species is not acquired, if slight variations or individual differences are constantly mistaken for and used as specific characters, this defect cannot be remedied by descriptions be they ever so long, nor the use of the most powerful microscope. Even the most careful and often repeated study of papers of this sort is not able to dispel the clouds of doubt and the veil of uncertainty that overhang and obscure all parts of the subject so treated.

There are a few groups of Coleoptera which have never been monographed. With the exception of one, viz., the sub-family Aleocharinæ of the family Staphylinidæ they are of comparatively small extent, but all of such a nature as to render their synoptic treatment a most thankless and by no means inviting task. Their omission, or only partial treatment, would not seriously interfere with the value of a compendium.

The second edition of the Classification of the Coleoptera of North America by Drs. Leconte and Horn shows that a compendium, such as proposed by Prof. Osborn, can be easily prepared as far down as genera are concerned; all that is needed is to make the additions and alterations

rendered necessary by subsequent papers. But I fully believe that American coleopterology has now advanced so far that even tables and diagnoses of the species can be given; in short, that it is possible now, if the preparation of the work is entrusted to the able hand of Dr. Horn, to produce a compendium fully equal in completeness, value and usefulness to Ludwig Redtenbacher's well-known Compendium which deservedly obtained a success unparalleled in the history of descriptive entomology. It bears the modest title "Fauna Austriaca [Austrian Fauna].—The Beetles", but is practically a full synopsis of the Coleoptera of North and Middle Europe, with tables of all European genera, and numerous references to the species of Southern Europe. Its influence on the progress of coleopterology cannot be overestimated, and is best illustrated by the fact that the work, although quite a bulky volume, quite expensive, and consisting exclusively of dry scientific descriptive matter, went through three editions during the life time of the author, each edition being fully brought up to date. The third edition, although now almost twenty years old, is still in the hands of every working coleopterist all over the globe. Its success as a scientific work, and as a business enterprise, has rendered possible the publication of a similar work on the Diptera of Europe, an order which at that time was perhaps more neglected in Europe than it is now in North America. I refer to Schiener's well-known "Fauna Austriaca.—The Diptera" which is modelled after Redtenbacher's work.

What is practically a fourth edition of Redtenbacher's work is now being published by Prof. M. Ganglbauer, of Vienna, and embodies, of course, the more recent progress in classification, and also enlarges the geographical scope of the work; but, what is by far more important, it promises to give due and full regard to the biology of Coleoptera. This leads me to indulge in a little speculation as to what role the biology of North American Coleoptera would play in the proposed compendium. I regret to say that I cannot draw here a very roseate picture.

Biology of Coleoptera is a slow science, and has by no means kept equal pace with the progress in the classification of the imago. The cause of this deficiency is to be found not so much in the lack of interest on the part of our coleopterists, but to the many difficulties that surround the subject on all sides, even in the elementary branches of the science. If we except a portion of the Chrysomelidæ, a portion of the Coccinellidæ, a portion of the Dermestidæ, and a few other genera or species, the mere finding of Coleopterous larvæ is a difficult thing, the rearing of the same still more

difficult, and the tracing of complete life histories from the egg to the imago state has been successful in comparatively few instances. The investigation of the food habits of imagos and larvæ, which is such a simple thing in Lepidoptera, becomes a complicated subject in Coleoptera. In the description and classification of the larvæ coleopterology encounters difficulties which do not exist in Lepidoptera. Coleopterous larvæ are, almost all of them, of a uniform colour. There is not that infinite variety of various ornaments, such as tubercles, bunches of long and bristly-coloured hair, appendices of various sorts, etc., which are of so great assistance in the description of caterpillars; their distinguishing structural characters are very minute, difficult to observe and to describe, and their relative importance and value have in many families not yet been pointed out.

In brief, the biology of our Coleoptera is yet in its infancy and coleopterology has not yet derived therefrom that benefit which the lepidopterists have obtained from a comparatively full knowledge of the earlier stages and general development. But I may be permitted to state here in defense of the coleopterist that, with all due respect to the many contributions of a purely scientific character, the great progress in the biology of Lepidoptera is in no small measure due to the desire on the part of the mere collector to obtain by breeding fresh imago specimens for their cabinets. This incentive is wholly absent in Coleoptera.

Of our commonest species of Coleoptera we are unable to find the earlier stages, and those larvæ we find commonly cannot be bred to the imago state. There is but little exaggeration in this sentence. But in spite of this difficulty there have been formed within the last twenty years some large collections of Coleopterous larvæ, which is, of course, the elementary and most important step toward a knowledge of them. Thanks to the attention given to this subject by Dr. Riley, there is now at the Agricultural Department in Washington a collection of Coleopterous larvæ which is the more valuable since most species have been actually bred. An idea of the extent of this collection can be formed from a list published some years since in "Insect Life", and enumerating nearly 130 species which could be spared from the duplicates. Since that time the accessions to this collection have been unusually large, not only from the eastern part of the country, but for the first time we find here represented, thanks to the exertion of resident specialists in Coleoptera, quite a number of genera or species peculiar to the Pacific slope. Hardly

inferior in extent is the collection of larvæ preserved at the Museum of Comparative Zoölogy, and I have no doubt that good collections are at the laboratories of the Cornell University and at Champaign, Ills., though I have no personal knowledge of them. Finally, I hope that valuable material is accumulating at the various experiment stations. What I said before of collections of imago specimens may be repeated here: if the biological material now scattered in various collections could be concentrated we would see that far more has been accomplished than we are generally inclined to suppose. Still, there is an almost exasperating want of knowledge of the larvæ of just such families or genera the systematic position of which is in doubt. Thus the larva of the South American *Hypocephalus armatus* would throw light, and in all probability fully clear up the affinities of this remarkable and much discussed beetle. In our own fauna, if we had the larvæ of *Cupes* or *Rhyssodes* the uncertainty regarding the affinities of these families would be removed; if we had the larva of the genus *Nicagus* we would at once know whether it is a Lucanid or a Scarabæid.

The life histories of Coleoptera, so far as these are of common importance have generally been well studied and recorded with great thoroughness. The investigations of the life histories of our Blister beetles, the root-feeding Chrysomelidæ, the Elateridæ, the May beetles, are only a few examples of what has been done since the foundation of our Club. How much can be learned by careful study of the natural history of what were supposed to be well-known Coleoptera is illustrated by Dr. Riley's recent discovery of the first larval state of our common Bean and Pea weevils (Bruchidæ), and also by Prof. Forbes's admirable studies in the food-habits of our common Carabidæ and Coccinellidæ.

Outside of economic entomology very little work has been done in the investigation of the full life history of our Coleoptera, except the almost countless little notes that have been published on the food-habits or other habits of both imago and larva, on the mode of work of the latter, time of appearance, length of life, number of annual generations, etc. These notes furnish in their aggregate much valuable, though somewhat fragmentary material for the biology of many species and genera. How difficult it is to trace the full life history of a given species is well illustrated by the Coleopterous Beaver parasite, *Platypsyllus castoris*. Through the exertions of Dr. Riley the most careful investigations were carried on in various parts of the country and at various seasons to fill

the gaps existing in the knowledge of the history and earlier stages of this beetle. Our most skilled field observers tried their hands in this investigation, scores of beavers were carefully combed from head to tail, the contents and surroundings of beaver dens, either of a dry, moist or wet nature, were thoroughly sifted, then packed up, shipped to Washington and here again subjected to the closest scrutiny. All of no avail; our knowledge of the natural history of *Platypsyllus* has not advanced a single step; even that mysterious object the "ultimate larva" has never been found or seen again, and stands out prominently as a sad example of disconnected solitude.

American contributions towards a classification of Coleopterous larvæ are very few, but we have a large number of scattered descriptions of single species. Some of this descriptive work has been excellently done, but a large proportion of these descriptions, both in scientific and economic literature, leaves much to be desired. There seems to be a notion on the part of some writers that it is a meritorious thing to draw up as quickly as possible and publish a description of any Coleopterous larva. If we examine such descriptions it will be found that they are not of any popular value because the untrained reader cannot understand them anyhow; nor are they of any scientific value because the student cannot find any tangible points in them. Such writers do not seem to be aware of the fact that there are many Coleopterous larvæ provided with six legs, the body being more or less flattened, the head a little darker and the thoracic segments a little longer than the abdominal segments, which are more or less transversely wrinkled. Quite a number of larvæ also have a Y-shaped mark on the head. Much better descriptions than those just characterized were excusable in bygone times when there was little known of the classification of Coleopterous larvæ, or when what little there had been published was generally not accessible to the American entomologist; but to-day where, in the works of Perris and Schiœdte, we have safe guides to the classification of Coleopterous larvæ of many families, descriptions of such larvæ should no longer be the result of momentary impulse but of a good deal of study and comparison.

It will take many years of hard work before the biological material accumulated in the collections mentioned above can be adequately worked up, and this work will be the more retarded, in my opinion, because I fully side with those who believe that at the present state of biologic science descriptions of Coleopterous larvæ ought to be accom-

panied by the most careful and detailed illustrations. But good figures are difficult to obtain. With admiration and envy I look at the splendid figures, unsurpassed in beauty and accuracy, that adorn, and in the true meaning of the word, illustrate, Schiœdte's monumental work, and I lose heart if I compare them with the cheap process figures of the most recent American works. How often have I seen the most splendid and accurate drawings made by our best draftsmen tortured into an irrecognizable mess by this modern process! I fully comprehend the many practical obstacles in the way of having our entomological publications illustrated with costly plates, but I have often asked myself why it is that we do not return to the trusty lithography or the faithful wood engraving which have illustrated many famous entomological works formerly produced in America. I regret that I am unable to give an answer to this question, beyond expressing the hope that a time will come when again a small amount of good and careful work will be more appreciated than a great deal of quick but much less satisfactory work.

In summing up the present state of the biology of our Coleoptera all I can say is that some good work has been produced, but that much more remains to be done on all sides. It is here, more than in systematic coleopterology, that we need more observations, more study, more work, and more workers.

Let me close my remarks with an appeal for more work and more workers in this field, and let me address this appeal to a class of men who by their training, their knowledge, their facilities for work, are best fitted to render assistance. I mean the entomologists of our Agricultural Experiment Stations. It has been asserted, not only once, but repeatedly, before this Club and elsewhere, that the economic entomologists are too much overburdened with professional duties to do any work in pure science. In reply let me point out that a great deal of the best work in entomology has been the work of love, and not of paid labour; that a great proportion of the best work in all branches of entomological science has been produced by men in the leisure moments of a busy professional life. Are our Station entomologists more overburdened with duties than a hard working teacher or a hard working physician? Above all, do not let us forget that the study of insects is no work, but that it is a recreation of the purest kind, a source of the highest pleasure; and no other science possesses a more powerful and fascinating attraction than our beloved entomology.

SOME BEAUTIFUL NEW BOMBYCIDS FROM THE WEST AND NORTHWEST.

BY B. NEUMOEGEN, NEW YORK.

MELIA, n. gen.

Head small, sunk in prothorax, hairy. Front narrow and hairy. Antennæ plumose. Palpi minimal. Thorax stout and very pilose. Abdomen stout, tapering off.

Primaries oblong, half as broad as long, well rounded at angle. Costa straight, apex rounded. Four submedian nervules, vein 5 apparently issuing out of cross vein. Three subcostal nervules, two of them forking off near apex. Secondaries nearly as broad as long, well rounded at apex. Anal angle well pronounced, like in the Notodontidæ. Median cell weakly connected by cross vein, looking like an open cell on a superficial glance. Three median veins, the fourth being replaced by a small groove or fold, which runs through entire wing from base to anterior margin, thus equally dividing it. Subcostal vein bifid near apex. Two submedian veins.

Legs well developed and extremely pilose, with tibial spines of good size, but covered by the hair. Tarsus, tarsical segments and claws prominent.

The genus is of sombre colour, and a near relative to the European genus Ptilophora, Stph., the antennæ and legs showing it. It has to be placed in our lists after the genus Gluphisia, B. Some of the latter genus likewise show indications of a horizontal fold in the secondaries, as, for instance, *G. rupta*, Hy. Edw.

Melia danbyi, n. sp.

Head, collar and thorax dark gray, powdered with minimal grains of yellow, of which latter tint are the rims of the prothorax and patagiæ. Eyes black. Antennæ gray with miminal yellow granules at base of stem. Abdomen dark gray with thin blackish segmentary lines.

Primaries dark gray, powdered with infinitesimal granules of lighter gray, and tufty at base. Costa dark gray, tipped with blackish colour near apex. Nerves black. A number of transverse undulating lines from costa to inner margin, of brownish black, the t. a. and t. p. lines being more visible than the rest. The t. a. line especially so, with whitish

accentuations inwardly, thus forming small whitish spots near costa and inner margin respectively. A small whitish costal spot near apex, and several small similar spots at inner rim of t. p. line.

Secondaries uniformly mouse-gray, somewhat hyaline in median and submedian basal areas. The entire anal margin tufted with lighter gray hair. At anal angle, between the submedian veins, a black blotch with several small white kernels. Slight indications of a transverse undulating line. Nerves brownish, and fringes of both wings brownish.

Below: Head black. Legs and abdomen of dark gray. The former very pilose, the tips of the hair tinted with yellowish gray. Black claws and tarsi, with white segments. Whitish abdominal bands.

Primaries and secondaries mouse-gray with whitish granules. The t. p. line only visible and accentuated by a whitish costal dot, surrounded by black.

Secondaries have two dark curved transverse lines, marked by two irregular, black costal dots. Basal areas of wings and anal margin of secondaries tufted with lighter gray.

Expanse of wings, 38 mm. Length of body, 10 mm.

Habitat: Victoria, B. C. Type, one ♂. Coll., B. Neumoegen.

This insect has been caught at electric light by Mr. W. H. Danby, and I take pleasure in naming it after him.

Hyparpax venus, n. sp.

Head yellowish with rose centre. Antennæ light brown. Eyes black. Collar, thorax, patagiæ, as well as primaries, of beautiful light rose colour. Nerves concolorous. Fringes whitish. Beyond median cell, from costa to inner margin, a transverse white line, slightly bending inwardly at its centre.

Secondaries and nerves white, with a rose coloured marginal line along costa and margin to anal angle. A rose tint along anterior margin, fading towards centre.

Abdomen yellowish-white with rose anal tuft.

Below: Primaries and secondaries of yellowish-white with concolorous nerves and fringes. Costas rose and broad marginal rose tints, especially so in primaries, fading towards centres.

Legs rose coloured. Prominent yellowish-white tibial spines.

Expanse of wings, 30 mm. Length of body, 9 mm.

Habitat: Colorado. Type, ♂. Coll., B. Neumoegen.

This is another of the discoveries of beautiful insects we owe to Mr. D. Bruce. It seems to be a rare species, for Mr. Bruce only caught one last year, and this summer only five specimens, among which one ♀, which, as he writes me, tallies in all details with the ♂ ♂. Its name is warranted by its beauty.

Notodonta descherei, n. sp.

Head gray; prothorax and thorax dark gray and pilose, rimmed with black. Patagiæ dark gray with whitish granules and black rims. Thorax, at abdominal juncture, prominently tufted with black. Antennæ light brown. Abdomen gray, with a light brown covering on first two segments. Legs gray, very hariy, except tarsi, which are black and have white segments and claws.

Primaries dark gray with white apical tinges reaching as far as third median vein. Interspaces of costal and subcostal veins marked by three black dashes, the upper one resting on costa, encircling an irregular white costal spot, the latter being the starting point of a transverse sinuate line of irregular whitish spots, terminating on inner margin near angle with a spot, surrounded by black. The basal field, as well as the median interspaces of a light brown shade. A black basal dash, edged with silvery white along basal portion of submedian vein. Nerves blackish. Fringes dark gray with black dots at nerval intersections. A black terminal line edged with white inwardly.

Secondaries light gray, shading somewhat darker near apex and anal margin, which latter is heavily tufted. A black shade with minimal white granules at anal angle, shading off towards median veins. Fringes and terminal line light gray, turning in anal region into the black colour of anal blotch. Nerves grayish-brown.

Below: Primaries blackish-gray from base to beyond discal cell, shading into lighter tints along anterior margin. Apex whitish, and a whitish costal spot above disk. Slight whitish indications of the transverse line. Terminal line well marked.

Secondaries gray with darker costal field of basal part and dark anal blotches. A suffused transverse white narrow band skirting edge of median cell. Terminal line blackish and prominent.

Expanse of wings, 45 mm. Length of body, 10 mm.

Habitat: Victoria, B. C.

Another of Mr. Danby's handsome captures at electric light. I take pleasure in naming this pretty insect after my lifelong friend, Dr. M. Deschere, of this city.

Halesidota sanguivenosa, n. sp.

Head, prothorax, thorax, patagiæ and abdomen brick red. Collar light yellow with a dividing centre line of yellow. Light yellow also marks the centre line of patagiæ, the sides and abdominal edges of thorax. A faint centre line of yellow on abdomen. Antennæ light brown with yellow dots at stem. Palpi yellow. Eyes black.

Primaries and costa brownish-red, of a lighter tint along anterior margin. All nerves blood red. Fringes, as well as the following maculations in light yellow.

Two transverse lines, a transverse posterior and a subterminal line, the former sinuate. The s. t. line consisting of irregular triangular spots, pointed inwardly, terminating at submedian vein, the t. p. line made up of irregular oblong spots, going right through and resting on inner margin. Irregular horizontal dashes along costa and median vein, a large somewhat triangularly shaped spot covering disk, pointing towards base. Small dots and dashes in basal part of intercellular space, and a basal dash on inner margin.

Secondaries semi-hyaline, of a delicate light yellow, tinged reddish along anal margin. Nerves and fringes concolorous.

Below: Primaries dull brownish-red with a vitreous sheen. All maculations as above and partly transparent.

Secondaries as above, with a prominent costal centre spot of brick red. Yellow segmentary bands on abdomen. Legs yellow, with an outer cover of bright brick red.

Expanse of wings, 31 mm. Length of body, 7 mm.

Habitat: Vancouver Island. Type, ♂. Coll., B. Neumoegen.

Undoubtedly one of the handsomest Halesidotas so far discovered in our fanua. To Mr. Chr. I. Weidt, a young professional collector, belongs the credit of its capture.

PREPARATORY STAGES OF CATOCALA STRETCHII, BEHR.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .04 inch, about .03 of an inch high; roundish conoidal, base broad but rounded, striated from base to micropyle, thirty-two striæ on the broadest part, sixteen of which reach the micropyle but a few are emitted just as they reach the circle; with very shallow cross striæ. Colour of micropyle whitish, a broad zone below this of purplish-red, next a narrow whitish zone about half the width of the red zone, then another red zone below the whitish, the last a little less than half the height of the egg. Duration of this period 157 days.

Young larva.—Length, .22 inch; cylindrical, slender, head flattened, the first and second pairs of prolegs atrophid. Colour after feeding, pale green, the head pale reddish-brown, three narrow, faint, dark lines on each side that are apparently purplish-brown, a spot or patch of the same on the centre of each joint ventrally; piliferous spots very small; hairs short, dark. Before eating the colour is dull smoky with a greenish tinge. Duration of this period four days.

After first moult.—Length, .30 inch; shape as before. Pale whitish-green, each side with three pale reddish-purple stripes, separated by stripes of the ground colour, a broken stripe of the purple along the lateral folds; head brown; piliferous spots as before; also the ventral spots. Duration of this period five days.

After second moult.—Length, .40 inch. Colour in stripes; the dorsal pale and with two pale stripes on each side, the lower substigmatal; the pale stripes having a pale outer part with darker centres, the dark slightly ellipsoidal on each joint; the dark stripes with dark edges and slightly paler centres but the contrast not so great as in the pale stripes. The dark part is pale red of a slight purplish-brown shade, the light part slightly creamy white with also a tinge of yellowish in the incissures of the joints. The dark centres of the pale stripes not quite so dark as the dark part of the dark stripes. Over joints 9, 10 and 11 the dorsal stripe is more distinctly white with little of the dark centre, the sides of the posterior part of joint 9 and the anterior part of joint 10 obliquely black shaded; also a little of this on joints 10 and 11; slight traces of this between joints 5 and 6, 6 and 7, and 7 and 8, seen more in intensifying the dark colours at these points. Piliferous spots inconspicuous, hairs jet black; no trace of lateral fringe; venter with dark spots on all the joints except thoracic. Head obscurely striped with the body colours.

One example shows much more of the black shading than the others, having it quite prominent between all the abdominal joints and in the dark parts of the stripes as a shading or staining. Duration of this period seven days.

After third moult.—Length, .70 inch. Striped as before but the striping more delicate, the stripes now showing that they are composed of dots, the dots in the dark stripes being a little darker than the dots forming the light stripes, the darkest dots forming the lines separating the stripes; the pale stripes show a little orange tinting, especially on the incissures; the piliferous spots inconspicuous, orange, the posterior on joints 9 and 12 a little more prominent, a blackish patch from those on 9 back obliquely on to the sides of 10; a small amount, mere trace, of the black back of the posterior dorsals of 12. Head coloured like the body, an anterio-lateral black stripe and an imperfect anterior one. Venter whitish, a large black patch in the centre of each abdominal joint; those of thorax blended into a narrow stripe. The lateral fringes begin to show. Duration of this period seven days.

After fourth moult.—Length, 1.10 inches. Only slightly changed from the preceding stage. Colour delicate whitish lilac; the piliferous spots a little more prominent than before and the fringe more developed though still short; the posterior part of joint 9 elevated between the posterior pair of piliferous spots, carrying these with the elevations, about .02 of an inch above the rest of the dorsum, the elevation orange in the centre, and from here blotches of orange and black extend obliquely down the sides on to the anterior part of 10; top of head with a slight orange tubercular elevation on each side of the centre making the head a little bilobed, a nearly continuous black stripe from the outside of base of tubercle down to the eyes, the rest of the head densely mottled with pale lilac and white; a very slight green tinge over the whole body, especially the venter, which is white with this green tint, the central round black spots on each joint proportionally smaller than before and the thoracic portion only a broken reddish-black stain between the legs; hairs inconspicuous, the upper black, the lower gray. Duration of this period seven days.

After fifth moult.—Length 2.50 inches. Very little change from the preceding stage; varying from a very pale lilac gray to darker, the pale forms having the piliferous spots and the elevation on joint 9 pale Naples yellow, the darker ones only a little darker of the same shade of yellow,

the latter with a black dot outwardly posteriorly to each piliferous spot, the black dot inconspicuous in the paler ones. Spiracles black. Very little or no shading of dark on lateral part of 9 on pale forms ; head as before.

Mature larva.—Length, 2.50 inches. More robust than at the beginning of this period. Width of head, .15 inch ; of joint 2, .25 inch ; middle of the body, .35 inch ; nearly cylindrical, venter a little flattened and the lateral fringe makes it appear more so than it really is ; character of markings about as last described ; in the light forms there is little variation in the shade of the light and dark stripes, the general effect being a pale lilac gray. The piliferous spots are very pale, but little darker than the ground colour. The dark stripes, as is usual, are composed of dots varying from a purplish-red to a reddish-black, those on the pale stripes simply averaging lighter, elevated part of the dorsal of 9 very pale orange. Head with the upper part yellow-orange. Venter as before. The dark forms have the greater average of dark dots in the dark stripes, and the ground colour in these stripes is darker, especially at the incissures, making sharp contrast between the light and dark stripes, but the piliferous spots are the same. Duration of this period four days.

Chrysalis.—Length, 1.30 inches ; wing and tongue case to posterior part of joint 5, .55 inch ; depth through 5, .32 inch ; through 4, .33 inch ; through 3, .34 inch ; through 2, .32 inch ; nearly cylindrical, tapering gradually back from 5, anterior part rounded, antenna case extending as far back as the wing case ; punctures of abdomen small and shallow ; cremaster so blunt and short as scarcely to be called conical, depressed ventrally, corrugated irregularly but mostly longitudinally, ending in a few hooks of varying lengths. Colour dark chestnut-brown, covered with a white bloom. Duration of this period from 44 to 53 days.

Three spun in the upper corner of the box in which they were raised two together in one common cocoon, the rest in the lower part, mostly in the corners and edges just above the dirt, on the sides of the box and among the refuse twigs and leaves where these came against the sides of the box, others among the leaves of the food-plant. The cocoon is thicker and more compact and firm than that of most species, those in the upper corners of the box being smooth inside, firm and mingled with loose web outside.

The eggs from which these larvæ were raised were sent me from

Colton, California, by Mr. G. R. Pilate, and were deposited Oct. 21, 1888. They hatched March 27, 1889, and the last one hatched June 20th, making a total period from egg to imago of 242 days. The food-plant given me by Mr. Pilate was cotton wood or willow. At the time they hatched the willows were just beginning to swell their buds a little. These were given to them and they ate them by boring into them, acting as borers in this stage just as the larvæ of *Ilia* do in oak buds; and some of them continued this boring habit till after the second moult, the young leaves at this time being about half an inch long. The fringe along the sides of the larvæ places this species near *Ilia* instead of with some other species that do not have the fringe; but of this I expect to have something to say in another article.

SYNOPSIS OF THE NORTH AMERICAN SPECIES OF ASTATUS, LATR.

BY WM. J. FOX, PHILADELPHIA.

FEMALES.

1. Marginal cell as long or longer than the first submarginal (if shorter it is scarcely noticeable) 2
   Marginal cell always much shorter than the first submarginal 6
2. Dorsulum rather strongly and closely punctured 3
   Dorsulum more or less sparsely punctured 5
3. Entirely black ..... *unicolor.*
   Abdomen red 4
4. Pygidial area long, narrow, a little more than twice longer than it is broad at the base; stigma of wings black ..... *bicolor.*
   Pygidial area of a more triangular form, not more than twice longer than its base is broad; stigma of wings yellowish ..... *pygidialis.*
5. Metanotum with a well-marked, triangular depression at apex; the length of the marginal cell is fully equal to the first submarginal; pubescence of thorax white ..... *occidentalis.*
   Metanotum without a well-marked depression at apex (if present at all it is very faint); the length of the marginal cell is a little less than the first submarginal; pubescence of thorax black; abdomen black or red and black ..... *nubeculus.*

6. Metanotum with coarse, irregular, radiating striations; antennæ and legs stout ..... *nevadicus.*
   Metanotum finely sculptured 7
7. Tegulæ testaceous; metanotum finely granulated..... *montanus.*
   Tegulæ whitish; metanotum very finely striated..... *elegans.*

MALES.

1. Marginal cell as long or longer than the first submarginal (if shorter it is scarcely noticeable)..... 2
   Marginal much shorter than the first submarginal 6
2. Entirely black..... 3
   More or less red..... 5
3. Pubescence of thorax black; forewings, except basal third fuscous; metanotum strongly reticulated..... *nubeculus (=nigropilosus.)*
   Pubescence of thorax white..... 4
4. Wings hyaline throughout; first joint of flagellum fully one-third longer than the second; metanotum not depressed before apex ..... *unicolor*
   Forewings stained with fuscous medially; first joint of the flagellum about one-quarter longer than the second; metanotum more or less depressed before apex..... *occidentalis.*
5. Pubescence of thorax white; metanotum recticulated..... *bicolor.*
   Pubescence of thorax black..... *nubeculus.*
6. More or less red; tegulæ whitish; wings subhyaline..... 7
   Cæruleous; wings fuliginous ..... *cæruleus.*
7. Metanotum very finely granulated ..... *elegans.*
   Metanotum very finely and transversely striated..... *bellus.*

ASTATUS, LATR.

Astatus, Latr. Precis. Caract. gen. Ins., p. 114., 1796.

Astata, Latr. Hist. Nat. gen. et part. des Crust. et Ins. III., p. 336., 1802.

Astatus, Kohl. Verh. Zool.-botan. Gesell. Wien. XXXIV., p. 431, 1885.

1. ASTATUS UNICOLOR, Say.

Astata unicolor, Say. Exped. St. Peter's River II., p. 337, ♀; Smith, Catal. Brit. Mus. Hym. IV., p. 310, pl. VIII., fig. 1., 1856, ♂.
Canada to Texas.

2. ASTATUS OCCIDENTALIS, Cress.

Astata occidentalis, Cr. Proc. Ent. Sect. A. N. S. Phila., 1881, p. III., ♂ ♀.

Resembling closely *nigropilosus*, but is at once distinguished by the white pubesence, and by the marginal cell being fully as long as the first submarginal; the depression on metanotum, apically, is much stronger. Length, 12-14 mm.
Nevada, Montana, Washington.

3. ASTATUS NUBECULUS, Cress.

Astata nubecula, Cr. Proc. Ent. Soc. Phila., p. 466, ♂.

Astata nigropilosa, Cr. Proc. Ent. Sect. A. N. S. Phila., p. IV., 1881, ♂ ♀.
Col., Nev., Cala., Mont., Washington.

4. ASTATUS BICOLOR, Say.

Astata bicolor, Say. West. Quart. Reporter II., No. 1., 1823; Lec. Ed. I., p. 166. ♀ ♂.

Astata rufiventris, Cress. Trans. Amer. Ent. Soc. IV., p. 218. ♀

Astata terminata, Cress. ibid. ♂.

Canada and the entire United States. *A. terminata*, Cress., is a slight variety, having the metanotum a little more strongly roughened.

5. ASTATUS PYGIDIALIS, n. sp. ♀.

Front strongly and rather closely punctured, sparsely so along the inner orbits; vertex very sparsely punctured; the distance between the hind ocelli is almost twice greater than that between these ocelli and the inner eye margins; antennæ rather stout, first

joint of the flagellum about one-quarter longer than the second, which is about equal to the third; collar and dorsulum rather strongly and closely punctured; scutellum, except on sides, almost impunctate; metanotum roughened and with irregular, radiating striations or ridges and with a strong medial carina, which extends to the apex where it joins a transverse curved ridge, which bounds the strong pyriform depression at this place, the sides and posterior face of metathorax roughened; legs tolerably stout, the posterior tibiæ and tarsi strongly spinose; abdomen very sparsely punctured; pygidium about twice as long as it is broad at the base, the sculpture appearing squamate. Black; mandibles medially, clypeus medially, scape beneath, tegulæ and legs, rufo-testaceous; abdomen entirely ferruginous, with a somewhat yellowish tinge; head and thorax clothed with tolerably dense, white pubescence; wings subhyaline, the apical portion darker; stigma yellowish; marginal cell a little shorter than the first submarginal, obliquely truncate. Length, 8-10 mm. Three specimens. New Jersey, Texas.

6. ASTATUS NEVADICUS, Cress.

Astata nevadica, Cr. Proc. Ent. Sect. A. N. S., Phila., 1881, p. V. ♀.
Nevada, N. Mex., Montana, Washington.

7. ASTATUS MONTANUS, Cress.

Astata montana, Cr., l. c., p. V. ♀.
Nevada, Col., Mont.

8. ASTATUS ELEGANS, Cress.

Astata elegans, Cr., l. c., p. VI., ♀ ♂.
Nevada, Col., Mont., Washington. This species appears to be closely allied to the *A. stigma* of Europe.

9. ASTATUS BELLUS, Cress.

Astata bella, Cr., l. c., p. VI., ♂.
So. California.

10. ASTATUS CŒRULEUS, Cress.

Astata cærulea, Cr., l. c., p. IV., ♂.
Nevada.

ON EUDRYAS STAE. JOHANNIS, WALK.

BY A. R. GROTE, A. M.

I saw the type of this species in the British Museum and considered it to represent a distinct species, allied to *E. grata*. Prof. Smith says, CAN. ENT., 134, "I have no hesitation in referring the species (?) as a suffused aberrant *grata*." Now the hindwings want the band and are immaculate, hence there is no "suffusion" on the secondaries. The forewings resemble *grata*, but the markings differ. I could see no "suffusion." The specimen seemed larger to me than *grata*. The specimen may be an extraordinary variety of *grata*, but not a "suffused" variety. Prof. Smith says:—"The type is marked 'Taken on the church door at Horsley Downs.'" And further:—"It is probable that in some way the pupa of the insect was transported to England and through the vicissitudes encountered an aberration was produced." This explanation does not seem reasonable to me. I do not know what is meant by "the vicissitudes encountered." Pupæ of *grata* transported to England would probably produce typical *grata*, just as pupæ of other species produce the typical form when they emerge on this side of the water. The voyage could not change a *grata* to a *Stae. Johannis*. I think this is certain. And, now, what did Walker mean by the name? He evidently supposed the specimen was taken at the St. John's River, Florida, and probably by Doubleday. He did not then believe in the authenticity of the label now attached to the species. Or is the church at Horsley Downs named in honor of St. John? The specimen is at any rate evidently American, as the genus *Eudryas* is found nowhere else. It is, as it stands, one of the most curious of the uniques in the British Museum collection. The improbability that it should have been taken on a church door in England (?) is very great. That the label might have been wrongly attached, or changed from some other specimen, seems less improbable when we consider the chances of its being so taken. If a variety of *grata*, or a distinct species, it seems likely that our collectors in Florida may throw some light on the subject in the future. If *grata* varies in this manner, the conditions will probably occur again and the variety be produced. It may be even that the specimen represents a South American species unknown to us. As the case stands, it cannot be called a "suffused" variety I should say, and the mystery is certainly not cleared up by the statements of Prof. Smith. We must find other

specimens of *Eudryas Stae. Johannis* before we can feel that any certainty in the matter has been secured.

[I find, on reference to the "Clergy List," that Horsly-Down is a parish of Southwark in Surrey, and that the church is named St. John's. I have, therefore, no doubt that Walker named the insect after the church where it was found. That Lepidoptera may become suffused, or altered in coloration, by a voyage across the Atlantic is evident from the fact that, out of ten pupæ of *Vannessa antiopa* recently sent to Englund by Mr. Fletcher, no less than five turned to the remarkable variety *V. Lintneri*. It is very probable that the specimen of *E. Stæ. Johannis* came from the pupa of an *E. grata* transported in some way across the Atlantic. The feminine termination "Stæ" is very singular.—Ed. C. E.]

PHLEGETHONTIUS 5-MACULATUS.

As an illustration of how insects will at times survive what seem to be the most unfavourable conditions, I may state that in October last there was given to me a chrysalid of the Tomato Sphinx, *P. quinquemaculatus*, Harris. Having no convenience for keeping it in a natural condition, I took a bit of cotton batting and made a bed for it on the bottom of my hatchery, which is a paste-board box with a gauze cover. The location of the box is on top of a high book-case, hence it gets the full benefit of the heat of the room during winter, which was sufficient to mature some Platysamias by the 10th of April. On the 16th of May that pupa gave a well developed imago. It was between six and seven o'clock p. m. when it emerged, and by half-past nine it was flying around the box, so I put it in the cyanide bottle; but it was killed too soon, for although the nervures were fully extended, and quite rigid, the membranes for three-fourths of an inch at the points of the front wings had no firmness to keep them apart, and they came together like the ribs of a closed umbrella. Otherwise the specimen was perfect in every respect.

J. Alston Moffat.

A REARING OF MELITTOBIA.

On the 21st September, 1891, on opening a small box of neglected insects, etc., I caught a glimpse of several minute black flies as they flew out. At the time I could not imagine what they were. The next day I collected a lot of pupæ of Tachina flies and enclosed them in tin boxes to transform to imagines, but instead of the perfect fly appearing, the boxes were filled with the same small flies as I had observed issue from the opened box on the day previous, and then, as I remembered having had some of those Tachina puparia in the box, I readily understood whence the flies came. The pupæ from which those little black hyper-parasites were bred were taken from the cells of the common Mud-dauber wasp. Afterwards I observed two specimens of this secondary parasite creep from a minute opening in the end of a pinned pupa of the primary Tachina fly which I had taken from a Mud-dauber's cell and put in my cabinet. I mailed specimens of this species to the Department of Agriculture at Washington, where it was identified as *Melittobia pelopaei*. This shows that the species of Melittobia are not exclusively parasitic on Hymenopterous insects, but are sometimes secondary parasites. As Mr. L. O. Howard wrote that the species of Melittobia had heretofore been reared only from Hymenopterous insects, I thought this rearing of *M. pelopaei* from Dipterous puparia might prove of interest.

A. N. CAUDELL,

Ringo, Cherokee Nation, Indian Territory, U. S.

[Interesting papers on this genus will be found in the Proceedings of the Entomological Society of Washington, Vol. II., No. 2, viz: "Notes on the genus Melittobia," by W. H. Ashmead (p. 228), and "The habits of Melittobia," by L. O. Howard (p. 224).—Ed. C. E.]

Mt. Carmel, Sept. 3rd.

The Canadian Entomologist.

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MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1892.

(Held at Rochester, N. Y., Aug. 17–19, 1892.)

The Rochester meeting of the Club was probably the most interesting, both in attendance and interest shown, that the Club has ever held. The sessions were held in room four of Anderson Hall, University of Rochester, with an average attendance of fifteen. Members registered and received badges as follows:—Dr. J. A. Lintner, Albany, N. Y.; E. A. Schwarz, Dr. C. V. Riley, D. G. Fairchild, W. T. Swingle, M. B. Waite, Wm. H. Ashmead, L. O. Howard, Dr. C. W. Stiles and Erwin F. Smith, Washington, D. C.; Chas. W. Hargitt, Syracuse, N. Y.; Prof. D. S. Kellicott, Columbus, O.; Dr. John B. Smith, New Brunswick, N. J.; Prof. Bèla Krécsy, Kecskemit, Hungary; Dr. E. B. Southwick, New York City; Prof. Herbert Osborn, Ames, Iowa; Rev. Chas. J. S. Bethune, Port Hope, Can.; Prof. F. M. Webster, Wooster, O.; Howard Evarts Weed, Agricultural College, Miss.; Henry G. Hubbard, Detroit, Mich.; P. H. Rolfs, Lake City, Fla.; Miss Edith J. Claypole, Miss Agnes M. Claypole, Akron, O.; Prof. G. H. Perkins, Burlington, Vt.; Prof. Wm. Saunders and James Fletcher, Ottawa, Ont.; O. F. Cook, Clyde, N. Y.; Rev. L. C. Wurtele, Acton, P. Q.; Prof. H. H. Wing, Ithaca, N. Y.

The daily programmes and announcement of the meetings were given in the programmes of the A. A. A. S.

MINUTES.

The Entomological Club of the A. A. A. S. held its first session in room four, Anderson Hall, at 10 a. m., on Aug. 17. Owing to the absence of the President, Mr. J. B. Smith called the meeting to order. On motion of Mr. Howard, the chairman appointed Messrs. Lintner, Bethune and Osborn a committee to arrange the programme for the meeting. The Secretary, Mr. Marlatt, being unable to be present, Mr. Howard Evarts Weed was elected Secretary for the meeting. It being the hour for the

calling to order of the general session of the A. A. A. S., an adjournment was taken until 2. p. m.

The Club met at 2 p. m. and was called to order by President Schwarz; twenty members present. The President called attention to the committees appointed at the Washington meeting of the Club who were to report at the present meeting. On motion of Mr. Smith, it was agreed to meet each morning at 9 a. m. and at such other times as would not interfere with the meetings of Section F. Mr. Riley occupied the chair during the reading of the address of the President by E. A. Schwarz, Washington, D. C.

[The address was published in full in the September number of the CANADIAN ENTOMOLOGIST, pp. 213–224.]

The address was discussed by Messrs. Riley, Smith and Howard as follows :—

Mr. Riley remarked upon the inferiority of modern as compared with older illustrations, one reason for this being the greater ease and rapidity of the illustrations of to-day. A good illustration is a labour of love and a scientific work. In detail illustrations the process method of illustration is satisfactory, whereas in copper plate and engraving the author must supervise the work, this being especially true in wood engraving. A wood engraver is more apt to damage a good drawing than the process methods. The latter have been a great aid to recent writers, who have thus had much advantage, and have been enabled to more fully illustrate their works. Mr. Riley thought that outline drawings were the most satisfactory, as they bring out the details more clearly.

Mr. Smith thought that the illustrations of the future would be largely made from photographs or photo-micrographs. It is now possible to prepare dissections and to have points of structure mounted in such a way as to bring out proper detail, and photographs can be made from these. Some details are thus brought out which otherwise would not be noticed.

Mr. Howard thought that there were two principal reasons for the inferior illustrations of recent writers. First, the artist does not understand how to draw for particular processes, and, second, although good illustrations were used, poor printing made them inferior work, as they required very careful printing and a good quality of paper. By the process methods illustrations are more easily and cheaply made, and thus more are now used.

The Club then adjourned.

THURSDAY, August 18, 1892.

The Club met at 9.30 a. m., President Schwarz in the chair, seventeen members present. The minutes of the first day's proceedings were read and approved.

On motion of Mr. Smith, seconded by Mr. Lintner, the full proceedings of the Club were ordered to be published in the CANADIAN ENTOMOLOGIST, and an abstract of the proceedings in "Insect Life."

At the Washington meeting of the Club the Secretary was asked to obtain as full minutes of the former meetings of the Club as possible, to be preserved in permanent form. A bill was presented for some of the back numbers of "Entomologica Americana" containing the proceedings, and Mr. Smith stated that he would see that the bill was paid. Mr. Fletcher asked how the small expenses of the Club were met, whereupon several of the former secretaries of the Club stated that these bills were paid by the Secretary. Mr. Kellicott thought that a law ought to be passed providing for the payment of the few necessary expenses of the Club. He was in favor of an assessment, as next year the Club should have an especially good programme.

Mr. Smith objected to an assessment as this was not done by other clubs connected with the A. A. A. S., and most of the expenses were paid for by the Association.

Mr. Osborn objected to an assessment, in that it was not known just who were members of the Club, the membership varying from year to year according to the attendance at the Association.

On motion of Mr. Lintner hereafter the Secretary is empowered to meet the necessary expenses of the Club each year, and present a bill for the same at a future meeting.

On motion of Mr. Smith the President was empowered to appoint a committee to nominate the officers of the Club for the ensuing year. The President appointed Messrs. Fletcher, Osborn and Smith.

Mr. Kellicott then exhibited specimens of pine twigs damaged by *Retinia comstockiana*. Mr. Southwick stated that this insect, so called, was common in Central Park, but a comparison of some specimens which he had with some at Washington had shown them to be a different species.

The following paper was then read:—

PREPARATORY STAGES OF CALOTHYSANIS AMATURARIA.

BY D. S. KELLICOTT.

The preparatory stages of this pretty Phalenid are not given in Packard's "Monograph of the Geometrid Moths", nor cited by Henry Edwards in his "Catalogue of the Preparatory Stages of N. A. Lepidoptera"; and, since they differ in some regards from the general characters of the caterpillars of the genus as given by Guenée, I have drawn up a brief account of larva and pupa.

The food plant at Columbus is *Polygonum dumetorum*, on which it was found in abundance during July and the first week in August.

Larva, 25 mm., long slender, cylindrical, with the last ring slightly swollen, and the first abdominal very much so, its diameter equaling twice that of the next ring. In ground colour there are two varieties: one deep brown or black, the other reddish or light brown. The skin under a lens exhibits paler lines and stripes made by whitish dots. Colour beneath similar to that above, except that the whitish stripes are plainer. The head is small, concolorous, with a white line on either side of the occiput extending on the prothorax; on the front there are four faint white longitudinal lines. On the 2nd, 3rd, 4th and 5th abdominal rings there is a pale lateral stripe, having three white curved lines on each, so arranged as to give the appearance of a slender stem twining about a rod. There are a few whitish dashes on sides of thorax; legs concolorous.

The larva clings to the smooth stems by its claspers, head downwards and body curved like an inverted clothes-hook. When disturbed it springs from its support to the ground, and quickly wriggles itself under cover. Its behaviour when walking is singularly hesitating and unsteady; after each step it lifts its body and explores right and left for danger before venturing another advance. When in this attitude its remarkably swollen first abdominal ring reminds one of a miniature cobra.

The pupa is light in colour, somewhat swollen below; the slender pointed abdomen tipped with black ends in a strong triangular piece edged with hooklets; the hind shield is triangular, with four tubercles between the base of the antennal covers and with the clypeal apex bilobed. Length, 12 mm.

The pupa is sustained among the herbage by a few silken threads, which are the merest shadow of a cocoon. Pupa July 26, imago Aug. 1.

Mr. Webster followed with a paper on

INSECTS REARED FROM GALLS ON MUHLENBERGIA MEXICANA.

BY F. M. WEBSTER.

Eight years ago, in Indiana, I found a gall on this grass that had somewhat the appearance of a diminutive ear of corn with the husks, but more pointed and minus the silk. The husks (I can find no better term for them) were imbricated and pointed, being placed regularly, one over the other, leaving the junctures along the margins. In this gall I found a pupa or, as seems now more probable, a puparium, but reared no insect therefrom. The past spring, Prof. L. H. McFadden, of Westerville, Ohio, kindly sent me a number of these galls, from which, and the stems to which they were attached, I reared the following species :—

Muhlenbergia Mexicana Gall.

1st. Several specimens of an *Oscinid.* 2nd. A *Pteromalid.* 3rd. A *Eurytomid.* 4th. A great number of *Lasioptera*, probably the author of the gall. 5th. Numerous examples of a species of *Polygnotus*, probably a parasite on the Lasioptera. 6th. Specimens of a species of *Eupelmus* that might have come from eggs of Orthoptera, which had been placed in the gall by the parent, or from the puparia of a *Chlorops*, of which I reared no adults.

Thus, from a single species of gall, with a few inches of the stems to which they were attached, were reared six species, with proof of their having contained the seventh, while another, the eighth, had used it as a nidus.

Replying to a question by Mr. Lintner, Mr. Webster stated that it was possible that all the species named did not emerge from one gall, as there were about twelve galls in the breeding jar, but all from the same locality. It was not known how many came from a single gall, or how many from any particular gall. He also remarked upon the recent researches of Mr. Enock in regard to the Hessian Fly, who found that the breast bone of the larvæ was used in turning around within the puparium.

Mr. Smith remarked that in all species of Cecidomyia which he had reared the larvæ turned, but he did not see the necessity of using the breast bone.

Mr. Webster asked if there were not Cecidomyidæ without a breast bone, and thought that if this could be ascertained the question of its use in turning would be settled.

Mr. Kellicott stated that all Cecidomyidæ turn in their burrows throughout their lives, those with strong breast bone turning about quite freely.

Mr. Webster stated that he had observed thin, almost transparent, empty cases projecting from the apexes of the galls, and also found them in the bottom of the breeding jar. These he took to be the cases of the pupæ, and similar to those observed in connection with the wheat midge. Their presence, in this case, implied that enclosed in these the insect made its way out of the coarctate larval skin, and to the outside of the gall, before the imago emerged. He also stated that it would be interesting to verify the statements of Mr. Enock as to the use of the breast bone or anchor-process in the turning of the larva within the coarctate skin.

As few of the members of the Club had seen Mr. Enock's paper, he would make some transcripts from it which would explain his meaning :— * * * "Anyone who will take the trouble to carefully examine, under the microscope, the *true* larva (by this I mean the larva in its first or *feeding* stage) will at once see that it does not possess any anchor-process at all ; and it is not until the *final* larval stage, when the larva is securely sealed up within the puparium or coarctate larva, or second larval stage, that the anchor-process is developed and utilized in the most wonderful manner." [Enock's Life-history of Hessian Fly, Trans. Ent. Soc. Lond., 1891, Pt. 2, (June) p. 336.]

"Though my endeavours to catch a larva in the act of turning round were not successful, I made some valuable observations from the contortions of the disturbed larvæ, the most important being that, by a powerful contraction of the muscles attached to the lower part of the anchor-process, the larva was enabled to draw the apparatus in at the base until it was at right angles to the normal position ; the head, too, was drawn *quite* in, so that the forked end of the anchor-process projected to its fullest extent, and whilst in this naked condition it is thrust into the inside walls of the coarctate larva, the muscles are relaxed, and the ventral surface brought into contact with the inside ventral surface of the coarctate larva. Then other muscles appear to move a portion of the dorsal surface of the body downwards and round towards the bottom or head-end of the coarctate larva ; the tips are then withdrawn, the base contracted again, and a hold taken by the tips being driven in a little

higher up; again the muscles bring a tiny portion of the body further round and down, and so this leverage goes on until the larva has completed its task, reversed its position, and rests with its head *up* and the anchor-process *outwards;* the spines on the skin of the larva, all of which point down toward the base, assist it materially in obtaining a firm hold on the inside of the coarctate larva, preventing it from slipping back." (Loc. Cit., p. 339.)

Mr. Lintner asked if the Cecidomyid on choke cherry has been described. Mr. Kellicott thought that the species had been described by Riley, but Mr. Osborn stated that he had had it under observation for four years, and so far as he knew no description of the species had been published.

Mr. Webster stated that he would send specimens of the galls on *Muhlenbergia Mexicana* to any members of the Club who so requested. He also stated that he had reared another species of *Lasioptera* from small, black, orbicular mines on the leaves of a species of Solidago, probably *S. lanceolata.* The species was very small and the larvæ were leaf miners.

Mr. Smith stated that he had seen the work of this species in New York, but he had mistaken it for fungus attack.

Mr. Stiles then made some remarks upon "A Cutaneous Disease of Cattle Caused by an Arachnoid." (This paper will be published in the next number of the C. E.)

In reply to a question, Mr. Stiles stated that this parasite was found as far west as Illinois and in many of the southwestern states. It shows itself on living animals by small lumps upon the skin, and after a time the hair dies at the place of attack. These, like most animal parasites, are only with great difficulty transported from one animal to another. There is a similarity in the species found upon the dog to that found upon the pig. It is hardly possible to mistake these parasites for larval forms, on account of the alomers upon the abdomen.

As the Section of Biology was in session, the Club adjourned until the close of that Section.

The Club met again at 12.15, twelve members present.

Mr. Riley read a paper upon *Galeruca xanthomelæna* polygoneutic at Washington, which will be published hereafter.

Mr. Smith followed with a paper on *Galeruca xanthomelæna* monogoneutic at New Brunswick, New Jersey.

THE ELM LEAF BEETLE.

(GALERUCA XANTHOMELÆNA, Schrank.)

BY JOHN B. SMITH, SC. D.

My first practical acquaintance with this species began at New Brunswick, N. J., in the spring of 1889. In the Rutgers College campus there are a considerable number of elms, many of them grand old trees, which for several seasons in succession and up to 1888 had been defoliated by *Galeruca xanthomelæna*, larva and imago. A double row of young trees, many of them elms, extends from the College campus to the Theological Seminary, a distance of about 280 yards, and at the beginning of this row, most distant from the Seminary, the Experiment Station building is situated. There are also a considerable number of elms among the other shade trees in this part of the city. It was my intention to protect the trees in and near the College campus, and near the Experiment Station, from injury; and, to obtain accurate data for a full history of the species, I noted the dates of the principal occurrences in the life of the insect. According to these notes, the hibernating beetles began appearing in 1889 about the middle of April, very gradually increasing in number to the beginning of May, when they became more plentiful. Eggs were first noticed May 12, giving larvæ May 24. The details of the destructive measures adopted are immaterial here, and are published in my Report for 1889. June 28 nearly all the beetles of the hibernating brood had disappeared, and after July 3 no more were seen. At this time all eggs were hatched. July 5th pupation was quite general, and imagos of the summer brood were developing in numbers July 15. There was a distinct period of a week or ten days during which no beetles could be found, and at that time no unhatched eggs were on the trees. The watch had been close, and I was positive that at the time the last of the hibernating insects had disappeared, the larvæ from the first lot of eggs laid were no farther advanced than full fed and ready for pupation. After the last days of June there were no egg masses to be found on the trees, and by the middle of August the beetles had all disappeared. I felt positive of my results, and published as a fact that the species was single brooded at New Brunswick. This was contrary to all that had been previously written; but in no published accounts were details of actual observations given. I repeated my observations in 1890 and 1891, and presented them at the Washington meeting of the Club. Dr. Riley felt quite certain that I was mistaken, though he could not question my observations, while

Dr. Lintner expressed surprise that the beetles should go into winter quarters in midsummer, and yet more that they should feed for so long a time previously. To settle the matter, if possible, I repeated my observations during the present season, while Dr. Riley carried on a series of observations at Washington, D. C. Dr. Riley, in *Science* No. 492 for July 8, 1892, records the facts that he then had imagos of a summer brood, and that these imagos had oviposited June 28. In a letter dated July 27, he informed me that the larvæ from these eggs had pupated. It is thus positively settled, that at Washington, D. C., there are two broods at least of this insect. My observations at New Brunswick gave an opposite result.

The season was rather later than that of 1889, and I saw no trace of beetles until May 17, and no beetles until May 19. The elms were at this time in full leaf, and began to show the characteristic little holes eaten by the insects. Eggs were first observed May 29, on a small tree, every part of which I could readily scan, and I selected this tree, which was a prime favourite with the insects, for special observation, while I also examined daily the trees in front of the Experiment Station building, the lower branches of which were within easy reach. Dissections made at this time showed that the ovaries of all the females were fully distended, each containing a considerable number of mature eggs, so many, indeed, that it was impossible to get out an ovary entire. The males, when examined, showed rigid, fully-developed testes, which were easily found and removed. The first batch of eggs gave larvæ June 6, and oviposition continued to June 20th, or perhaps a little later. The hibernating beetles gradually lessened in number, and had disappeared entirely June 30. On June 29, I found the first pupa, and on that day collected all the unhatched egg clusters I could find—a very few only. One of these clusters gave larvæ July 1, and all the others failed to hatch. During the first days of July, I gathered about 200 pupæ or larvæ ready for pupation, and beetles began appearing July 8 in the open air, as well as in my jars. There were then on the trees at this date larvæ of all sizes, pupæ and beetles of the summer brood, but *no* egg masses. The beetles in my breeding jars were fed until August 1, at which date all refused to feed further. I had noticed, a few days previously an indisposition to feed among some of the older beetles, and had noted, too, an unusual accumulation of excrement at the bottom of the jar. I found, later, that the last thing done by the beetles before retiring to winter quarters is to

empty the entire digestive tract. During the three weeks or more that the beetles were in my possession, I did not notice a single copulation, nor did I get an egg mass. Observations outdoors were to the same effect; not a copulation; not an egg-mass. On the new shoots put out by the trees early in August, there are now—the 13th—plenty of beetles, but neither eggs nor larvæ. When I observed this disposition to cease feeding, I dissected a number of the beetles, and in all of them I found the sexual structures undeveloped. The ovaries were minute, and could only be found by securing the large vagina to which they were attached. In the male it was almost impossible to get the testes entire, as they were mere empty tubules, which tore with the slightest strain. A number of newly-hatched beetles were secured and dissected, with the same results. Then a collection was made, selecting those with fully distended abdomen. In none was there more than a slight development of the ovaries, while in all, the digestive tract was gorged with food, and fat globules and masses were forming. I observed also that on the leaves some beetles had discharged long strings of excrement, and they were beginning to appear on the windows of my laboratory and in my house. I accepted this as an indication of a desire for retirement, and as I knew that the bell tower on the main college building was a favourite resort, I sent my assistant to investigate it, August 8. He brought back a vial filled with beetles, and reported that in a rubbish heap on the floor, covered by an old board, the beetles were to be found in large numbers. The bell tower was dark enough to make the use of a lantern necessary, and as there was no other explanation of their presence there in such large numbers, I feel justified in assuming that these beetles were in winter quarters. A number of these specimens were dissected, and in all of them the most prominent feature was the great mass of fatty tissue stored in the abdominal cavity. In all of them the entire digestive tract was free from food or excreta, and in all, the sexual organs were undeveloped.

I consider it positively proved that there is only one generation of this species annually at New Brunswick, N. J. The life of an individual beetle may extend from early in July of one year to well along in June of the following year, and the three weeks feeding time in summer is necessary to enable the insects to store a sufficient quantity of fatty tissue to help them through the nine months of lethargy. The feeding in early spring is again necessary to mature the sexual organs and develop the eggs in the ovaries of the female.

Mr. Riley accepted the facts brought forth by Mr. Smith, and remarked on the statement that the latter had found the ovaries more or less developed in some individuals. He had no doubt but that the species was normally single brooded at New Brunswick. This year the beetles had appeared at New Brunswick two weeks later than last year, which showed that the time of appearance varies greatly. One curious fact brought forth was that the beetles appeared at the same time as at Washington. He remarked also on the fact that during the month of June at New Brunswick there was no evidence of the development of larvæ, which was not the case at Washington. Life is quicker in the more northern regions, and under such conditions acceleration might be expected which was not the case with this species. There is a difference between the life at New Brunswick and that at Washington, and somewhere between these two places there must be a dividing line. Such cases of peculiar characteristics may be explained by heredity. Acquired characters which are beneficial have fixed themselves upon the species, and this, no doubt, accounts for the single or double broodedness of this or any other species.

Mr. Smith called attention to the fact that the observations recorded in the present paper were made in 1889 and the present year, while the observations of '90 and '91 were reported in the proceedings of the Club last year.

Mr. Southwick stated that in New York City spraying for this species was begun about the last of May and that he thought the species was there two, or perhaps three brooded, although Mr. Beutenmeuller of the American Museum has so far noticed but one brood.

In reply to a question by Mr. Lintner, Mr. Riley stated that at Washington the greater part of the second brood of beetles hibernated, although some doubtless laid eggs for a third generation. They disappear in August at Washington at the same time the first brood disappears at New Brunswick.

Mr. Schwarz called attention to the fact that there was a vast difference between the climate of Washington and New Brunswick, which difference he had especially noticed in the coleopterous fauna of these two places. An important investigation in this regard would be the behaviour of the species in the latitude of Baltimore and Philadelphia. The first brood did more damage at New Brunswick than did the same brood at Washington. In Washington it is the second brood that does the most damage, this brood being much more numerous.

Mr. Smith stated that as much difference as is noticed between the fauna of Washington and New Brunswick was also noticed in New Jersey itself between the red shale and the sandy plains regions, while many peculiar forms were found in the hilly north.

Mr. Riley thought that by an exchange of specimens between Washington and New Brunswick it could be easily proved that the single or double broodedness of the species was an acquired habit. He was strongly of the opinion that those received at Washington from New Brunswick would remain single brooded irrespective of climate, while those received at New Brunswick from Washington would be double brooded there.

Mr. Lintner asked if this matter of heredity was not the same in the difference noted between the thirteen and seventeen year Cicada.

Mr. Riley thought that this was the case, the seventeen year Cicada being a northern, and the thirteen year Cicada being a southern species.

In reply to a question, Mr. Smith stated that most of the larger Bombycids *(Saturniidæ)* were double brooded in New Jersey.

The Club then adjourned until the afternoon, immediately after the adjournment of Section F.

The afternoon session was called to order by President Schwarz at 4.15, eleven members present.

Mr. Hubbard read the following paper :—

THE INHABITANTS OF A FUNGUS.

BY HENRY G. HUBBARD.

In the forest-clad portions of the Pacific Coast Range, from the Columbia River northwards into British Columbia, there are frequently seen on the trunks of pine trees which have been injured and blackened by fire, small white fungi almost globular, or slightly flattened and kidney-shaped, varying much in size, but frequently attaining the dimensions of a pigeon's egg. This fungus, kindly determined for Mr. E. A. Schwarz and myself by Prof. Galloway, is *Cryptoporus (Polyporus) volvatus*, Peck., var. *obvolutus*, Peck. It is very tough and leathery, and is remarkable for the extension of the pileus, which forms a thick coriaceous veil, covering the hymeneal surface below, and entirely enclosing it in a cavity which retains the spores as they fall. A small aperture in the veil, less than one fourth of an inch in diameter, penetrates the cavity from beneath. This opening is never in the centre of the underside, but is placed near

the base of the fungus; often so close to the bark of the tree as to escape notice. It gives ingress to a number of bark insects, and these visitors, it may readily be believed, play an important part in the dissemination of the spores and the propagation of this fungus, carrying the fructifying germs in their wanderings from the storehouse of the fungus into direct contact with the inner layers of the bark in which the mycelium lives and thrives. Other insects gaining an entrance by the same opening feed upon the substance of the fungus, and in process of time entirely disintegrate and destroy it, but probably in the process of destruction assist or hasten the ripening of the spores. If the full history of this fungus and its insect fauna could be written, many facts of great interest would undoubtedy be evolved, and it could perhaps be shown that we have in this cryptogam a peculiar structure adapted to the dissemination of the spores by insect agency, and analogous to the contrivances found in many flowering plants for the ensuring of cross-fertilization, or the economical distribution of pollen. Unfortunately, our acquaintance with this little cosmos is limited to a few desultory observations made in the field during a collecting trip to the northwest coast and the mountains of British Columbia, along the line of the Canadian Pacific Railway, during the months of May and June of the present year. Some of the insects observed are new to science or remain undetermined, and imagos were not bred from the larvæ found in the fungus. My present purpose in presenting these incomplete and imperfect notes is to call attention to an interesting association of insects that will well repay further study, and to stimulate further researches into the study of the inter-dependence of insects and fungi.

An entomologist accustomed to collect insects in our eastern woods will remark with surprise the comparative poverty of the bark fauna in the magnificent forests of the Pacific Coast. This is due partly to the thinness and tightness of the bark in many western conifers, and partly to the humidity of the climate, which favours the rapid growth of fungi, and these in fallen trunks quickly cement the bark to the wood. It is comparatively rare to find in these forests a log from which large pieces of bark can be readily removed, and which therefore swarms with bark insects as do logs of oak, elm and pine in the East. The bark insects of that region must find a welcome and often a timely refuge in the dark cavity of the Cryptoporous fungus, and as the plant is abundant on the tree trunks throughout extensive districts that have been overrun by fire, it may

readily be believed that this plant is an important factor in the distribution of certain species of Coleoptera. Thus I found lurking in this fungus *Cucujus clavipes*, a beetle that is usually rather fastidious in the selection of its abiding place, and which in regions where the basswood, with its loose, thin layers of inner bark, flourishes, will rarely be found elsewhere than in dead logs of this tree. The ubiquitous species of Trogosita are frequent visitors, as might be expected from their predatory habits, and other members of the family, as *Temnochila virescens*, *Peltis* and *Calitys*, were also seen, and in their company the tenebrionid, *Phellopsis porcata*. These, however, are genera which affect the neighborhood of coriaceous bark fungi everywhere, and their presence in this society is quite a matter of course. The rare tenebrionid, *Bius estriatus*, of which a single pair, presumably male and female, was captured in the cavity of one of these fungi, would seem to be a casual visitor only, as its attenuated, cylindrical form is adapted to threading the galleries of Scolytidæ and other bark-boring insects. Other insects, which for want of better knowledge may also be considered intruders, were an undescribed species of *Odontosphindus* in the imago, and a considerable number of unknown but probably predatory larvæ, including that of *Trogosita* and a clerid, which in the present state of our knowledge of coleopterous larvæ it would be useless to examine.

Aradus debilis, Uhler, an extremely thin and flattened hemipteron, swarms in and about the fungus, and evidently finds the cavity a favourable place of deposit for its eggs. A multitude of its young heaved and tumbled the dust within nearly every fungus. All ages were represented there, but the adult bugs seem to prefer the heat and warmth of the sun, and are found on the bark of conifers infested with the fungus. Their bodies, especially when immature, are particularly well adapted to transport the spores of a fungus. Everything in the nature of dust clings to them, and I have no doubt they constitute one of the most reliable propagators of the plant.

Perhaps the most interesting of the inhabitants is the Nitidulid beetle *Epuræa monogama*, discovered by Crotch, and described by him in 1874. He says of it: "Found in Vancouver and throughout the Sierra Nevada in the small white globular fungus which occurs on dead pines. This will be found to have a hole underneath, and if carefully detached a pair of the above insects will generally be found, unless a marauding *Trogosita*

has taken possession."* My experience was that the "marauding *Trogosita*" frequently had taken possession, so that the monogamous *Epuræa* was by no means as abundant as I could have wished, for this beetle has, I think, not been seen since Crotch's time. It is a giant of its genus, being nearly equal to *Phenolia grossa* in size, and its colour is so dark and lustrous a brown as to be almost piceus. Notwithstanding its large size and conspicuous contrast in colour with the dead white of the fungus, it is a most difficult insect to discover, by reason of the facility with which its spine-clad body attracts and retains the white dust or spores of the fungus. This gives it perfect concealment in its home within the cavity of the fungus, and when abroad and denuded of its coating of dust, its dark colour harmonizing with the charred bark of the pine tree renders it almost invisible. On the 7th of June, at North Bend, in the Fraser River canon of B. C., I found the beetle occasionally present in fungi which had recently matured and were giving off spores, and always in pairs, as indicated by Crotch. Old devitalized fungi, or those already occupied by other insects, have no attraction for this beetle. Its larva was much more common, and undoubtedly the adult beetles become abundant later in the season. The full-grown larva is half an inch long, and is a very striking object. It is always coated heavily with dust and spores, and when at rest is almost invisible, but when in motion the segments part at the sutures, showing the pale pink colour of the body, and the animal looks like a moving necklace of pearls. It feeds only upon the spores, and the cavities of the fungi occupied by them never show any signs of having been gnawed or eaten on the sides.

Another beetle, *Platydema oregonense*, was very common in the cavities of the Cryptoporus at North Bend. It is one of the largest species of the genus, and several of them crowded into one small fungus must have found themselves rather cramped for room. It is not likely that the *Platydema* is dependent on the Cryptoporus for its living. Our eastern species of the genus are indiscriminate feeders upon many kinds of fungi, although they are usually associated with the tougher coriaceous sorts. The larva of *P. oregonense* was found commonly with the imagos, occupying the natural cavity or eating holes in the hemispherical upper portion of the pileus. Whenever the larva was present in the cavity of the fungus, the latter was always more or less filled with a loose tangle of brown filaments resembling hair. The nature and origin of these filaments

*Trans. Amer. Ent. Soc., Vol. V., 1874, p. 76–77.

has not been satisfactorily made out. Peck, in his description of the fungus, refers to them as if he considered them a product of the plant. He says: "It is not unusual to find little heaps, or even masses of spores retained within the veil. These heaps of spores are generally permeated by minute filaments, which apparently aid in holding the spores together." † Observe that the author speaks of them as generally present, leaving it to be inferred that they are in some cases absent. This accords with my observations. Many of the fungi having matured and become dry retain the tangles of filaments, in which also the cast skins of the *Platydema* larvæ may be found suspended. Other specimens can easily be found which have never been occupied by this insect, and contain no filaments. Moreover, this fungus is not the only one exhibiting a similar connection between a *Platydema* and these hair-like filaments. I can recall instances in which artificial cavities made by boletophagous larvæ in the pileus of some of our eastern fungi were similarly filled with filaments, among which the larvæ of a *Platydema* passed actively back and forth. I am, in fact, of the opinion that these filaments are closely connected in some unexplained way with this beetle. If not produced directly by the *Platydema* larvæ itself, they may be a separate fungus engendered by its debris. In any case they certainly serve a purpose very useful to the active larva in providing it with a convenient scaffolding on which its lithe, elongated and exceedingly slippery body is securely supported, and by means of which it can climb about and reach any part of the interior of the cavity, the walls of which it is engaged in eating away.

It remains to mention a few other insects which attack the substance of the fungus, burrowing into the spongy pileus and piercing holes innumerable in its leathery walls, ultimately disintegrating and destroying it. These are a species of Cis or Ennearthron, and two lepidopterous larvæ which were not studied and remain entirely unknown. My field notes merely state that one of these is a larva nearly an inch long, living in the hymeneal cavity and filling it with web. The second species is a shorter and thicker larva, which eats its way into the solid base and thick upper portions of the pileus, entirely destroying the whole structure. Three or four of these larvæ are found in one large specimen of the fungus.

The work of the Cisid and its larva is too well known to require a detailed description. The beetle occupies in great numbers the cavities

† Bulletin Torrey Botanical Club, Vol. VII., 1880, p. 102.

and burrows made by larger insects, and feeds indiscriminately upon every part of the plant, while its little white larvæ bury themselves deep in the tough and spongy interior, gradually reducing it to powder. Under the combined attacks of the adult *Cis* and its larva the fungus becomes a thin, dry shell, tattered and riddled with holes. Or its hold on the tree trunk being undermined, it is beaten to the ground by rains, and becoming water-soaked is abandoned to the snails, poduras and scolopenders.

LIST OF INSECTS IN CRYPTOPOROUS VOLVATUS, VAR. OBVOLUTUS, PECK.

Cucujus clavipes, var. *puniceus*, Mann. Predatory (?) visitor.
Trogosita, sp. not determined, and larva. Predatory visitor.
Temnochila virescens. Predatory visitor.
Peltis Pippingskoeldi, Mann., and *ferruginea*, Linn. Predatory visitors.
Calitys scabra, Thunb. Predatory visitor.
Bius estriatus, Lec. Probably a fungus eater.
Phellopsis obcordata, var. *porcata*, Lec. Fungus eater.
Odontosphindus, n. sp. Fungus eater.
Epuræa monogama, Cr., and larva. Feeding on spores.
Platydema oregonense, Lec., and larva. Feeding on pileus.
Ennearthron, n. sp., larva and pupa. Feeding on the fungus.
Araclus debilis, in all stages. Predatory (?), breeding in the fungus.
Two species of lepidopterous larvæ, undetermined. Feeding on the fungus.
Unknown coleopterous larvæ of several species. Probably predatory.

In reply to a question from Mr. Weed, Mr. Hubbard stated that no dipterous larvæ were noticed, and Mr. Schwarz stated that the fungus was doubtless too dry for the larvæ of this order.

Replying to a question by Mr. Ashmead, Mr. Hubbard stated that he thought a very similar fungus was to be found upon pine logs in the South.

Mr. Schwarz hoped that this paper would bring forth other investigations of a similar character showing the intimate relations of insects and fungi.

Mr. Riley then read a paper on "The American Bean Weevil," which will be published hereafter.

In reply to a question by Mr. Fletcher, Mr. Riley stated that this species could not be definitely stated to be of American origin.

Mr. Lintner stated that Say's description of *Bruchus obsoletus* was very general, and Dr. Horn only claimed that the description "fits the species fairly well." In deference to the opinion of some of our coleopterists who thought that the name *obsoletus* should be retained, Mr. Lintner had used this name in his seventh report. Mr. Lintner also stated that he considered the species a native of Europe or Asia, probably the latter.

Mr. Schwarz thought that Say was not always correct in regard to the food plants upon which he states insects are found.

Mr. Smith thought that descriptions which fit even fairly well must be accepted, for if this was not done about ninety five per cent. of the descriptions of Lepidoptera by Walker would have to be thrown out.

Mr. Fletcher stated that when young larvæ were in peas, the radicle would be the first point attacked. It had been his experience that only from two to five per cent. of attacked peas germinated.

Mr. Lintner stated that those which germinated and gave vigorous plants had but few pods, and these but few beans. One point of interest was that *obsoletus* is not found in Canada except when directly brought in.

Mr. Webster then introduced Dr. Edward Murphy, of New Harmony, Ind., who gave the Club an interesting account of the life of the pioneer of American Entomology, Mr. Thomas Say. Dr. Murphy was intimately acquainted with Mr. Say from 1827 to the time of his death in 1834. "In boyhood Mr. Say was a great collector of all sorts of natural history specimens. He was the most perfect gentleman that I ever met in my life, and I do not believe that he had an enemy in the world. He was tall, about six feet in height, square built, but not fleshy. In winter he wore a thick buckskin overcoat. He had a peculiar lisp in his speech which was pleasant to hear. As a boy I worked in a printing office where some of his works were published. Mr. Say was a very pleasant story teller, and very studious. The colour of his eyes was gray. He always lived in a very plain manner, and his old home is still standing at New Harmony, and in fair repair. His wife often accompanied him on his collecting trips. She was a very pleasant lady. Mr. Say was induced to come to New Harmony by Mr. Maclure, an amateur naturalist."

Mr. Hubbard then read the following paper :—

THE LIFE HISTORY OF XENOS.

BY HENRY G. HUBBARD.

How often, in turning over the pages of his check-list, has the American collector of beetles allowed his eyes to rest a moment upon those lines of type which announce the existence in our fauna of the mysterious family Stylopidæ, with its two genera, *Stylops* and *Xenos*, each represented by a single species; but, recognizing in these names only the records of captures almost legendary in their antiquity, he has turned the page with a feeling that they represent to him unattainable rarities. In fact, to most minds they bring to remembrance only the remarkable bat-like figure of the male Stylops, which for generations has done duty in all the encyclopedias and text books. But why should these insects be considered unattainable rarities? Are they as rare in nature as their vacant places in our collections would seem to indicate? I do not hesitate to assert that they are not. If we question any hymenopterist of experience, he will tell us that Stylopized bees and wasps are not uncommon. By this is meant that specimens of hymenoptera are found having certain chitinous particles protruding from their hinder bodies, appearing at the sutures between the abdominal segments. These betray the presence in the wasp or bee of either the female or the pupa of the male parasite. In the first case the so-called head of the female presents only a bluntly-pointed scale, so flat and thin that it hardly raises appreciably the horny covering of its host, and, at most, barely peeps out beyond the edge of the overlapping plate. The pupa of the male, on the other hand, is a cylindrical capsule of considerable thickness, and often distorts the smoothly tapering abdomen of the hymenopteron. Its darkly chitinous, convex end projects boldly forth, and certain little tubercles upon its surface form a grotesque face, with staring goggle eyes, which are in fact faceted, and perhaps give a limited amount of vision to the nymph imprisoned within. When the winged male of the parasite issues from this capsule, the mask-like face is pushed off like a cap and falls to the ground. As a rule, when stylopized hymenoptera are captured in the field, the male parasites have long since issued, and hence their rarity in our collections. But the females never leave the bodies of their hosts, and might be readily obtained at certain seasons.

In general it has long been known that Stylops inhabits bees, and Xenos wasps of the genus *Polistes*. As far as I know the male of Stylops is not to be found in any American collection, but specimens of Xenos

have been sparingly collected in this country, and it may therefore be of interest to relate my own experience in procuring them.

In 1891, while studying the insects that attack the orange in Florida, I had occasion to examine the nests of *Polistes Americanus* (Fab.), which are very commonly found in orange trees. This species is one of the largest in the genus, and its sting is quite equal in severity to that of our white-faced hornet. It is, moreover, very active and belligerent in defending its home, so that the investigation of its social economy is attended with considerable danger and difficulty. However, it is not inclined to be irritable unless directly attacked, and with care I was able to approach sufficiently near one of their large, naked paper nests to observe all their movements without seriously alarming the colony. One of my first discoveries was that many of the adult wasps were stylopized. Sometimes eight or ten of the parasites distended the body of a single wasp, and this without destroying its life, although it could be seen that such overburdened individuals were lacking in vitality, and appeared to be on the sick list, as they rarely left the shelter of the nest. The older wasps were actively engaged in attending to the wants of the colony, and were constantly departing and returning with small caterpillars and other insects, which, after masticating into pulp, they fed to the young, both larvæ and imagos. The callow young, however, passed several days of their adult existence in a state of inactivity, and did not leave the vicinity of the nest, apparently acquiring their full powers, both mental and physical, rather slowly. I soon found that only these late comers in the colony carried about with them the undisclosed males of the parasite. The pupa cases found in the bodies of the older wasps were invariably collapsed and empty. This decided me to take possession of the nest and confine it in a vivarium, where I could study the young wasps from the time of leaving their cells in the comb. After some difficulty, and not without carrying away with me a few tokens of the vengeance of its defenders, I bore away the comb in triumph, and suspended it in a small box with sides of glass, through which I could observe everything that transpired. Through the wooden end of the box I inserted a tube filled with sweetened water and closed with a bit of sponge. I included in the box, as caretakers for the young, one or two fully adult wasps. These soon resigned themselves to their new surroundings, and not only themselves drank liberally at the feeding trough, but also attended to the wants of the larvæ and the newly disclosed wasps, which immediately began to make their appearance from

many capped cells in the comb. In about a week I had a colony in full career, and it soon became so populous that I was obliged to remove many of the adults. This was accomplished with the aid of a long pair of forceps manipulated through a trap door.

As my primary object was to secure the coveted males of Xenos, I was not a little chagrined and surprised to find that these continually escaped me, and in some mysterious manner disappeared, so that I was not even gratified with a glimpse of one of them. That they were produced within the vivarium I could not doubt. The empty capsules protruding from the bodies of many of the wasps were evidences of this, and the little mask-like lids which lay plentifully scattered about on the bottom of the box confirmed the fact. Moreover, many wasps a day or two old wandered about with the little faces of the unopened male capsules grinning at me from between the joints of their bodies, as if mocking at my discomfiture.

At last, early one morning, chancing to take a look at my captives, I observed the whole society in a state of great excitement. Wasps stood about with wings half raised or vibrating angrily, with antennæ alert and watchful, while now and again one of them would make a sudden dart with its jaws at an invisible object in the air. The whole company seemed bewitched. Steadying my eyes and watching closely I began to see several misty little objects darting with fury about the box, ever and anon dashing among the wasps, which, like cattle attacked by gad-flies, huddled together in groups and awaited the onslaught. In the dim half light of the early morning I could not follow their rapid movements with my eyes, but their whereabouts could be told, from time to time, by the commotion among the wasps whenever one of them approached very near. Finally, on the floor of the cage, a male Xenos suddenly made its appearance, spinning round and round on its back like a fly with its wings burned in a candle flame. A Polistes standing near the spot promptly pounced upon it, and, before it could be rescued, had reduced it to pulp in its jaws. In the same manner I lost, one by one, all of the four or five specimens that were abroad at that time. Such was the watchfulness of the wasps, and so great their hatred and fury against these little persecutors, that in spite of all precautions nearly all the male parasites were captured and destroyed before I could lay my hands on them. I succeeded in saving not more than half a dozen specimens out of more than a hundred that were set free in the box. As no additions were made

to the brood, and many of the youngest larvæ died in their cells, in a few weeks my vespiary came to an end, having been under observation from the 23rd of June to about the middle of July. From the study made of its habits during that time I am able to give the following review of the life history of Xenos. Many of the facts are not new, but have been so rarely observed that it will not be amiss to repeat them.

The young issue from a slit in the so-called head, which may after all be the anal extremity of the mother, after it has protruded from the body of the wasp. A single female gives birth to hundreds if not thousands of them. They are at birth six-legged triungulins, fairly active, but so small that they are barely visible to the naked eye. Under a hand-lens they bear a marked resemblance to the young of scale insects, having a similar oval form and a pair of long anal stylets. They wander over the body of the wasp, apparently giving it no inconvenience, and are also seen crawling about the nest. In some way they pass into the bodies of their hosts while the latter are very young larvæ. Within the bodies of the wasp-grubs they occupy varying positions, but always in the fatty matter near the skin. Their form now becomes very elongate and worm-like, without any organs visible under low magnifying powers. Their delicate and transparent bodies seem to be simple sacks filled with fatty matter, in which float globules of oil. When full grown the larva of Xenos is about three-eighths of an inch long. The female parasite finally acquires a chitinous plate at one end of the body and becomes adult. The male shortens to about one-half its former length, thickens and becomes cylindrical, the anterior end is chitinous and shows traces of faceted eyes and rudiments of other organs, the convex end of this chitinous portion is separated by a sutural line, and forms the mask-like cap of the puparium. While the wasp is in pupa, or at least before it has left its cell in the comb, the parasites of both sexes push their chitinous extremity out of its body, appearing at the sutures of the last four or five segments. Within a few days after the wasp has left its pupa cell, the male Xenos pushes off the lid or cap of its puparium and makes its appearance, taking flight at once. It never alights or rests in its flight from the moment of birth until it falls exhausted and dying, worn out by the incredible activity of its short existence. Its life as an active imago cannot be longer than fifteen or twenty minutes, if as long, and during this time it exhibits fiery energy, and flies so rapidly that the eye can hardly follow it. Its legs are shrunken and entirely useless organs, and I think the muscles

are atrophied, as I never saw the legs move even in the death struggles. How the fertilization of the female is accomplished I am unable to state, but that it must be the act of a moment is evident from the watchfulness of the wasps, who would certainly not permit these buzzing little whirligigs to remain more than an instant in contact with their bodies.

All the males bred by me issued very early in the morning, and most of them before daylight. I do not think its delicate wings and imperfectly chitinized body could support, even for a single minute, the light and heat of the sun. A specimen which I liberated in the day time from the body of a wasp, took flight and escaped at once when the cap of its puparium was pulled off. I found it a few minutes later quite dead on the table a short distance away.

The species of *Xenos* bred in Florida from *Polistes americanus* is probably undescribed; it is smaller and paler than *Xenos Peckii*. The latter is said by Harris to have been "discovered by Prof. Peck in the common brown wasp *(Polistes fuscata)* of this country." Judging from the numbers of stylopized specimens of this wasp which I have seen it must be far from rare in some colonies. The few specimens of *X. Peckii* which I have been able to obtain were all extracted from their puparia in the bodies of wasps taken near their nest between the walls of an old building. One specimen which I collected in the Cumberland Mountains of Virginia issued from the body of a *Polistes* found hiding under bark. I imprisoned the wasp in a glass tumbler, and several days later found the parasite dead and adhering by one wing to the side of the glass.

A good device for procuring specimens of *Xenos* from colonies of *Polistes* known to be infested with the parasite would be to enclose the nest in a box having a false bottom of wire netting through which the males of *Xenos* would fall as they die, and which would thus prevent the wasps from destroying them.

Mr. Hubbard stated that he had never seen stylopized wasps of any genus but *Polistes*.

Mr. Ashmead stated that they were quite common among the Andrenidæ.

Mr. Riley thought that these parasites could be divided into two classes, those that were carried into the cells by the female wasp, and those that were deposited by the parent of the parasite.

Mr. Kellicott stated that the case bearer, *Thyridopteryx ephemeræ-*

formis, which he had found at Columbus, Ohio, were somewhat different from those exhibited by Mr. Southwick, *i. e.*, more nearly cylindrical.

Mr. Riley stated that he knew of no other species of Thyridopteryx similar to *ephemeræformis*, although this species differed much as to the character of their cases, especially those upon pine, when compared with other trees.

Mr. Kellicott stated that the larvæ of *Pterophora melsheimeri* which he had noticed at Columbus did not have the prominent paddle-shaped appendages at the side of the head as always described; that the case was a more perfect structure than that figured by Harris; and that the moth's wings were more deeply sinuate, with the edges trimmed with white.

The Club then adjourned.

FRIDAY, August 19, 1892.

The Club met at 9.45, fourteen members present. The minutes of the morning meeting of the previous day were read, and after amendment, approved.

Mr. Lintner occupied the chair while Mr. Schwarz read a paper upon the Males of *Xyleborus*.

Mr. Schwarz stated that there was no relative proportion of numbers of the females to the number of males. In reply to a question by Mr. Lintner, Mr. Schwarz stated that the white lining found in the borings of *dispar* and other species was supposed to be a fungus, but it was not known definitely.

Mr. Smith thought it could be easily determined if it was a fungus by microscopical examination.

Mr. Osborn followed with Notes on the Species of Acanthia.

NOTE ON THE SPECIES OF ACANTHIA.

BY HERBERT OSBORN.

I desire to call attention to the species of this genus, in order to get further information, if possible, as to the occurrence of the species in this country. The species of the genus that were described by Jenyns (Annals of Natural History, 1839, III., p. 241-244) have often been considered simply as the common house-bug occurring upon the different animals which they were described as infesting—the bat, the pigeon, and the swallow. As these descriptions are quite inaccessible to most students, it will be in place to repeat them here, so that they may be compared and

used in the examination of any specimens obtained from different species of animals :—

" *Cimex hirundinis.*—This species is rather less than *C. columbarius*, and in respect to form different from both that and the *C. lectularius.*

" The antennæ are comparatively short, and the third joint is scarcely, if at all, longer than the fourth. The eyes are not so prominent, the thorax is much less hollowed out in front, the anterior angles but little produced, and the sides scarcely at all reflexed. The scutellum is wider at the base or more transverse, and does not project so far backwards. The elytra are less coarsely punctured; the abdomen is not so broad and more rounded at the apex; the sides regularly curved. The whole insect is more pubescent. The colour is ferruginous inclining to testaceous, darker than in the common bed-bug, and the head and thorax are much clouded with fuscous. In one specimen the legs are spotted at or near the joints with this last colour. There are also some fuscous spots on the abdomen.

" The young or pupæ have the abdomen much narrower than the perfect insect, inclining to oblong.

" *Cimex pipistrellæ.*—The antennæ of this species are of an intermediate length between those of the *C. lectularius* and those of the *C. columbarius*, and the third joint is obviously longer than the fourth. The eyes are prominent. The thorax has a moderately deep excavation in front, and the sides are partially reflexed. The abdomen is narrower than in either of the above named species, and much more attenuated posteriorly, the greatest breadth being rather before the middle. The thighs are more incrassated. The whole insect is more pubescent approaching to hispid, and rather coarsely punctured. The colour is dark ferruginous-ochre, glistening with a faint metallic or sub-aeneous hue, not perceptible in any of the other species. The legs and antennæ are a shade paler than the abdomen, and, as well as this last, without spots.

" *Cimex columbarius.*—On comparing this species with the common house-bug, it will be found to be smaller and of a more orbicular form. The antennæ are shorter, and the joints are not quite so slender, and the difference in length between the third and fourth joints not so considerable. The thorax is rather less hollowed out in front, the anterior angles less produced, and the sides less reflexed. The abdomen more nearly approaches to round, the lateral margins being very much curved, and the greatest breadth exactly in the middle; whereas, in the house-bug the lateral margins are at first but little curved, and the greatest breadth rather

behind the middle. The colours, as well as the punctures and the degree of pubescence, are similar in the two species."

Of these species the first named, the *hirundinis*, has been collected in large numbers by Prof. Gillette and myself at Ames, from the nests of barn-swallows, being first reported to us by workmen who were placing eavestroughs on the barn.

A short note on the species was published by Prof. Gillette in "Entomological News," under the name of *pipistrellæ*, with Mr. W. H. Ashmead cited as authority for the determination. The use of this name came from some verbal misunderstanding, we believe, and there is no question as to the specimens belonging to the form described by Jenyns as *hirundinis*. The specimens when compared with *lectularius* show very distinct differences, and these differences appear to be constant, as well as the habit of the insect, and it seems to me that the separation of the species is well founded, especially if the other forms are as distinct as this, and we would gather as much from the descriptions which have been quoted.

I should very much like to secure specimens or information as to the occurrence of the other species in this country, and the principal object of this note is to engage the attention of some one who may have the opportunity to examine the nests of bats and pigeons, where possibly they may be found.

The species found in the swallows' nests appears to remain entirely in the nests or upon the barn adjacent to them, some being observed on the sides of the barn nearly down to the ground. They were very abundant after the swallows had left, and specimens kept in a bottle corked with a rubber stopper were alive and active the following summer, so it would seem an easy matter for them to remain in the nests till the return of the swallows in the spring. The nests contained immense numbers of empty egg shells, showing that the eggs were deposited directly in the nests, and where the young bugs when hatching would at once get access to the birds.

In reply to a question by Mr. Stiles, Mr. Osborn stated that his observations were based upon the examination of several hundred specimens. He had examined what few bats he had had in the laboratory, but had had no opportunity to examine them in caves.

Mr. Lintner stated that housekeepers were generally of opinion that swallows brought *Acanthia* into houses.

Mr. Hubbard stated a case coming under his observation where a bat

had been put into an entomological case, and upon examination of the case afterwards a living *Acanthia* was found.

Mr. James Fletcher gave an entertaining account of a trip to Nepigon, north of Lake Superior, in quest of eggs of *Chionobas macounii*. No eggs of that species were obtained; but many interesting observations were made. Eggs of *Nemeophila selwynii* were secured, and the larvæ bred from them were described. *Grapta faunus* was bred from larvæ found on *Alnus viridis*, *Salix discolor* and *Betula papyrifera*, and an undescribed parasite was also reared. *Grapta progne* was also reared from larvæ on *Betula papyrifera*. The pupæ of several species of Grapta were described and outlines shown on the blackboard by which they could be distinguished. *Colias interior* was mentioned, and the food plant was stated to be willow (from the observations of Mr. T. E. Bean in the Rocky Mountains). Mr. Fletcher was of the opinion that it was also *Vaccinium*. Specimens of two western species of Argynnis, *A. cipris* and *A. electa* were taken at Nepigon, and the occurrence there commented on. *Lycæna lucia* was taken and an addition made to its food plants in the flowers and seeds of *Acer spicatum*. *Carterocephalus mandan* is not uncommon at Nepigon in roadways running through low woodlands. Eggs had been secured on grasses and several larvæ were being bred. *Nisoniades icelus*, common at Nepigon, was being bred from eggs laid on the upper side of the leaves of *Salix cordata*. The larvæ were found to exhibit different temperaments, one particular specimen being described as "very bad tempered". Some beetles had been collected, and the oviposition of *Myodites zeschii* in the unopened flowers of *Solidago canadensis* was described. An interesting Mordella had been taken on a white fungus growing on an old wharf, but the species did not seem to answer to any of those in the available literature. Species of Donacia, Leptura and some Carabidæ had been collected. *Trirhabda convergens* had been found abundantly on asters and solidagos. Of Hymenoptera many interesting species had been secured, *Abia kennicottii* amongst them, and several specimens of *Trichiosoma triangulum*.

Mr. Smith remarked upon the inactivity of Myodites. He had taken them upon solidago in New York State and had experienced no difficulty in collecting them upon the flowers at any hour of the day.

Mr. Schwarz stated that they were very active on buds, and it was somewhat difficult to collect them.

Mr. Cook then gave a few Notes on the Arthropoda of Liberia.

[TO BE CONTINUED.]

NEW NORTH AMERICAN HOMOPTERA.--No. V.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

1. THAMNOTETTIX SMITHI, n. sp.

Male: Form of *Th. quadrinotata*, Fab., but with the vertex shorter and more depressed. Greenish-yellow; head yellow with a transverse black band on the anterior edge; body black the segments edged with yellow. Length 4½ mm.

Head rounded before, very little longer at the middle than next the eye. Vertex a little depressed, anterior edge subacute; apex of the front two-thirds the width of the base, sides nearly parallel below the antennæ. Clypeus strongly widened apically where the width is but slightly less than the length, edge of the cheek rectilinear either side of the prominent lateral angle. Pronotum rather long, hind edge but moderately concave, the angles obvious. Antennal setæ long and stout, dusky. Valve obtuse-triangular, its length and breadth subequal; plates irregularly ovate, shorter than the valve, sutural edges arquated, touching only at the middle, outwardly heavily fringed with long white hairs; pygofers slender, longer than the plates, viewed from beneath lanceolate with slightly diverging tips.

Colour pale greenish-yellow, lemon-yellow on the vertex and connexivum, anterior edge of the head marked with a conspicuous broad black transverse band just below the line of the ocelli; sutures of the clypeus and front slenderly black. Meso-, and meta-thorax and abdomen deep black, narrow edge of all the segments, the scutellum and the genitalia greenish-yellow, the disc of the valve and a spot on the base of the pygofers blackish. Elytra sub-hyaline, smoky at apex, with slender greenish nervures. Wings smoky, iridescent.

New Brunswick, N. J. Described from a single male example kindly given me by its captor, Prof J. B. Smith, to whom I take pleasure in dedicating it. This is a neat little species pertaining to the group represented by the European *quadrinotata*.

2. THAMNOTETTIX LONGISETA, n. sp.

Female: Closely allied to the preceding species. Dull yellowish or dusky green. Vertex as in *Smithi*, anterior edge more obtuse, impressed line blackish at base, disc anteriorly with a small dot behind each ocellus, edge with a transverse row of four large subquadrate, approximate spots placed just below the line of the ocelli; edges of the front more deeply

excavated opposite the antennæ, disc with three or four blackish arcs interrupted on the middle; clypeus less expanded apically. Cheeks thin, discoloured exteriorly, angles more rounded than in *Smithi*, sutures of the face more heavily lined with black. Second joint of the antennæ annulated with black; seta long, as in the preceding species. Pronotum shorter, with the sides more oblique, the posterior angles more rounded, and the hind edge more deeply excavated than in *Smithi;* disc greenish, marked anteriorly by a slender, oblique black line behind the eyes, touching the lateral angles. Elytra hyaline, slightly infuscated toward the apex; nervures very distinct, pale blue-green, brownish at apex. Beneath black; narrow edges of the connexivum and abdominal segments, outer angles of the last ventral segment, and sides of the pygofers, yellow. Legs pale yellow. Last ventral segment rather long, hind edge entire, truncated, the outer angles slightly produced. Length 4 mm.

Northwestern Colorado. Described from a single female example received from Prof. C. P. Gillette. This is closely related to *Th. Smithi*, of which it may prove to be the female, but the differential characters mentioned above seem to entitle it to specific distinction.

3. THAMNOTETTIX GILLETTII, n. sp.

Form and general appearance of *Th. lætus*, Uhl.

Female: Colour yellow, tinged with greenish on the pronotum. Vertex moderately produced, apex rounded, basally with an impression either side of the middle. Front narrower than in *lætus;* clypeus widened apically, the sides arquated. Apex of the head with two large round spots, and on the vertex on either side is a smaller one placed against the middle of the inner margin of the eye. Pronotum highly polished with an impressed line parallel to the anterior edge, hind edge nearly straight. Scutellum polished, the impressed line black. Sutures of the front and the antennal pits black, the setæ dusky. Sternal and pleural pieces black, the latter edged with yellow. Abdomen yellow, disc of the tergum and the oviduct black. Legs yellow, tips of the tarsal joints dusky. Elytra hyaline, smoky at tip, nervures yellow, becoming heavier toward the inner margin. Last ventral segment rather long, outer angles rounded, apex nearly straight with a narrow linear notch. Length 5 mm.

Colorado. Described from a single female example received from Prof. C. P. Gillette, to whom I take pleasure in dedicating this pretty little species.

In Mr. Gillette's material was an example of a species I take to be Mr. Uhler's *Jassus (Thamnotettix) lætus*, but it differs from his description in wanting the minute fuscous dots at the tip of the vertex, and the black basal spots on the scutellum. In this specimen, a female, the last ventral segment is cylindrical, a little longer than the preceding and feebly arquated behind without a median notch. Clypeus slightly narrowed apically, its sides rectilinear.

4. THAMNOTETTIX MONTANUS, n. sp.

Allied to *Th. clitellaria*, Say. Smaller; dark brown or blackish, face pale. A transverse band on the pronotum and a small spot on the elytral suture yellowish-green, polished. Length 4½ mm.

Female: Head obtusely rounded before, soiled white or yellowish, base of the vertex with a transverse fulvous-brown band between the eyes covering the apical one-half of the pronotum, ocelli fulvous; front with a few short brown arcs next the edges, the sutures blackish, clypeus slightly widened apically; cheeks infuscated below the eyes. Pronotum polished, pale greenish-yellow on the posterior one-half, hind edge feebly concave. Scutellum dark brown, blackish on the base and apex, the impressed line black. Elytra blackish, costal half of the corium as far as the apical areoles hyaline, apex of the clavus and its nervures black, sutural edge with an oblong greenish spot. Beneath black. Legs whitish. Abdomen black; connexivum, a slender median line on fourth and fifth, apex of the ultimate, and the narrow edges of all the ventral segments, and the oviduct, pale yellowish. Last ventral segment deeply cleft either side of the ligulate median projection, the shorter lateral lobes rounded, retreating at the outer angles. Male: More deeply coloured, scutel and elytra black; abdomen black, connexivum and ventral segments narrowly edged with yellow. Valve half the length of the last ventral segment; plates nearly three times the length of the valve, punctured, obtuse, suture straight, outer edge feebly convex; pygofers exceeding the plates, pale, as is the apical half of the plates.

British Columbia; Mountains of northwestern Colorado. Described from a fine pair received from Prof. Gillette and one male received from Mr. W. H. Harrington and labelled "British Columbia." This latter differs from the Colorado male in being more deeply coloured, with the transverse band between the eyes black, and showing two small transverse spots on the base of the front.

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MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1892.

(Continued from page 265.)

Mr. Osborn followed with a paper upon

HONEY-BEE OR HOUSE-FLY.

BY HERBERT OSBORN.

Ever since entomologists have classified insects and attempted to assign a relative rank to different members of the class, the honey-bee has had the distinction of standing at the head of the list, has been the crowning point, the apex of an immense pyramid of inferior forms.

That so useful a member of the insect class should occupy this exalted position has seemed most appropriate, and that the reign of the honey-bee has had universal sanction is proven by the fact that it has so long held undisputed possession of the throne.

In recent times, however, ruthless hands are raised in treasonable attacks upon Queen Apis ; and whom do they propose to crown instead? No less an arrant disturber than the ubiquitous, omnipresent, insolent fly. Down with Queen Apis!! Up with King Musca!! How does that sound?

All this is proposed by a young man, Prof. Aldrich, who makes flies his especial pets, and he backs himself up with such authority as Prof. Hyatt and Miss Arms, and is seconded by Prof. Townsend. The worst of it is that these revolutionists seem to have the logic of the situation. To be sure, it is suggested that the sheep-tick may, in the ultimate analysis of the scheme, be the enthroned insect, but we fear that all other claimants will be downed by the house-fly. What a travesty on beneficent evolution, to produce this pestiferous plague—the most unmanageable rascal afloat—as its most finished piece of insect handiwork. Can nothing be done to avert such a calamity? Have we no talented evolutionist who can discover some series of relationship to prove that Musca lacks

the royal blood to entitle him to the throne, or, if his lineage be too strong, had we not better establish a democracy of insects and, by the suffrages of tortured animal life, relegate this buzzing busybody to his proper sphere?

Seriously, however, I am led to inquire whether there is not strong reason why we should make an effort to avoid the expression of lineal rank in groups of animals. The most specialized are often degraded in many respects, and there is no basis for the expression of rank except their phylogeny, and the higher groups of insects are certainly not connected in any lineal series, but represent divergent, or in some cases, perhaps, nearly parallel branches from some common ancestral form or group of connected forms. To place any one group as the head of a lineal series is to give an expression that is not present in nature.

Lists of insects may have to be written in a lineal order, but can we not emphasize more strongly the point that this order is not an expression of natural relationship?

Mr. Smith thought that the line of argument adopted by Messrs. Aldrich and Townsend was inconclusive, and that the article referred to carried with it its own refutation. He thought Mr. Osborn was correct in that the orders should be placed parallel, but that groups or families were more highly developed in some orders than in others. Mere specialization is never a test of rank in itself, and any line of argument that places the Hippoboscidæ at the head of the insects as the highest in rank, is simply unworthy of attention, since it omits the intellectual or nervous development as a factor.

The Secretary read the following paper:—

THE LIFE-HISTORY OF THE NORTHERN MOLE-CRICKET—GRYLLOTALPA BOREALIS.

BY E. W. DORAN, PH. D., COLLEGE PARK, MD.

Although this is a common insect in many parts of the United States, it is not generally found in great numbers in any locality, and, notwithstanding its general distribution, the various stages of the insect seem not to have been described or figured.

While I am not yet able to clear up all the points in its history, I have studied the insect in all its stages, though I have not reared it from the egg to maturity, on account of the time required for it to develop—in all probability three years.

During the last six months I have had about fifty specimens in confinement, representing all the stages of the insect. They were nearly all obtained in one limited locality, about the edge of a small pond near the Maryland Agricultural College. I found every stage in this locality except the egg. Two females oviposited in the breeding jars, and I now have larvæ about two months old. I present the following description of the insect in all its stages :—

1.[a] *The egg.*—The eggs were deposited in confinement in irregular heaps without any apparent arrangement. The number is only 40 to 50, though it is stated that *G. vulgaris* deposits 200 to 300. There is an irregular enlargement of one of the canals, about an inch and a-half in diameter, in which the eggs are placed.

The egg is of a dirty whitish or light brown colour, opaque, with no distinct external markings. Length, about 3 mm.; width, 1.7 mm. Shape slightly ovoid-reniform.

The date of the deposition is a little uncertain. May 20, 1892, I made extensive excavations in their burrows, but found no eggs, though I took three gravid females ; one of these was dissected, and the eggs appeared pretty well matured, though not full size. Two females were placed in confinement, one had oviposited June 8, eggs from the second were not found till June 25. The eggs of the first had hatched June 18, ten days after they were found. The eggs of the second hatched between Aug. 1st and 10th, about a month and a-half after the first lot, and five or six weeks after they were deposited. Both were subjected to the same conditions.

2. *The larva.*—When first found the larvæ may have been a week old. They closely resemble in appearance the mature insect. Length, 6 mm. ; antennæ long, 37 mm., anal stylets, 3 mm. Head and thorax shining black, with median dorsal line lighter. Abdomen lighter in colour than thorax ; the dorsal part of each segment dark brown, the space between segments creamy ; the first three rings very dark, the rest lighter, except the 7th, which is generally broad and dark. The underside of the body is creamy white. Anterior pair of legs light brown, middle pair with femora darker, posterior pair darker except at the joints, tarsus of first pair broad, toothed, as in imago. Legs and abdomen slightly pubescent. Before the first moult the larvæ have the power of leaping several inches. After this they do not seem to have this power, and are more sluggish in their movements. After the first moult they have the

power of ejecting a viscid, nauseous fluid for protection, and if several are confined in close quarters they invariably get badly "stuck up" if excited. After first moult the colour of the dorsal part of the abdomen is darker.

The larval stage evidently lasts about two years. Several specimens taken Jan. 4, 1892, were about 13 mm. long. These kept in confinement in a warm room during the winter moulted April 18th, when all died. They were then about 16 mm. in length. May 20, two or three larvæ were found which were very little larger than those taken in January before. They are said to be inactive in winter, hence had not grown so fast as those kept in a warm room. Along with these small larvæ were taken some about 18 mm. in length, but much stouter in appearance, all of which had pupated before June 18. These last larvæ were evidently about two years old, and after pupating were not distinguishable from pupæ taken at the same time.

3. *The pupa.*—After pupating they are about 29 mm. in length, with considerable increase in thickness, especially in the abdomen. There is a very slight change in appearance otherwise, except for the appearance of the small wing pads.

This stage evidently lasts almost a year. Those which pupated in June, or last of May, will not deposit eggs this year. They are yet (Aug. 15) pupæ.

4. *Imago.*—The mature insect has but short, apparently feeble wings, while the body is long and heavy, hence their powers of flight are evidently not great. The male measures about 31 mm. in length, while the female may reach 37 mm. or 38 mm. This stage has been described and figured in various publications.

Food Habits.—It is generally supposed that the mole cricket lives chiefly upon roots of grasses, etc. I much doubt that this is the usual food, and it is certainly not the entire food. In the wild stage the burrows are generally found in moist, sandy places near the water, often where no vegetation is found. They make long, winding channels, often six to eight inches deep, forming new burrows very much like a mole. This habit would seem to indicate that they are in search of animal food, especially angle or earth worms. In confinement they seem to feed but little, if at all, upon roots of grasses, and for several months they have had nothing but earth worms given them, and they seem to thrive upon this diet. If pressed by hunger they will readily devour the smaller or

weaker of their own kind. If two are confined in a small vessel over night one generally kills the other. Several of my specimens have been destroyed in this way.

Mr. Smith asked if it was known that some of the Acrididæ occasionally fed upon animal diet, and stated a case where a species of *Melanoplus* had been fed upon house flies.

Mr. Riley stated that several of the Acrididæ were known to be omnivorous, especially *Melanoplus spretus*. He also stated the experience he had had when in France in regard to a secret remedy a Frenchman had for destroying *Gryllotalpa*. Upon investigation, the secret remedy was found to be nothing but pouring soapsuds into the holes made by the insect.

Mr. Fletcher gave his experience with a specimen of *Gryllotalpa* in confinement in a glass jar. Potatoes were planted in the jar and the roots spread throughout the bottom of it. Meat was placed on top of the earth in the jar, but so far as he could notice the specimen ate nothing. It is a very animal-like insect, and is rare in Canada.

Mr. Hubbard thought that the *Gryllotalpa* was common in Canada, but was hard to find except in particular places.

Mr. Weed stated that he had the species sent for identification quite often, but it was rare except in particular places.

Mr. Riley then read a paper on "The Osage Orange Pyralid," by Mary E. Murtfeldt, Kirkwood, Mo. (Published in "Insect Life.")

Mr. Weed stated that the species was quite common in Mississippi, the moths having been taken abundantly.

Mr. Smith stated that the osage orange in some parts of New Jersey was seriously attacked by the Bag-worm, *Thyridopteryx ephemeræformis*, which was the only thing that seemed to trouble it.

Mr. Riley then read the following :—

NOTE ON A BORER IN THE STEM OF THE RED CURRANT.

BY E. W. CLAYPOLE, AKRON, OHIO.

For several years I have observed traces of a borer in the tips of the twigs of my red currant bushes, whose habits did not correspond with those of any insect with which I am acquainted. My knowledge of the subject is very limited, and I consulted the department at Washington. In reply it was suggested that possibly it was the same insect which infested the tips of the raspberry, *Oberea tripunctata*. But the facts not

quite agreeing with this reference, I wrote to Prof. Riley, stating the facts in the case. The mischief, if such it can be called, is first noticed in the middle of May, two or three weeks before the signs of *O. tripunctata* are seen, and the girdling consists of a single ring instead of two, or if there are two the lower one is very indistinct. Moreover, the tip of the twig fades at once, and much more quickly than when attacked by *O. tripunctata*. Lastly, the later attack of *Oberea* is in my garden confined to the raspberry. I never find it on the red currant.

I was requested to send some specimens about the end of July, and I did so just before starting for this meeting. I received a reply a day or two ago from Mr. Marlatt, in the absence of Dr. Riley, saying that the insect was probably the *Janus flaviventris* of Fitch, found by Professor Lintner recently at Adrian, Mich. It is a saw-fly of the family Cephidæ, whose early history has not been well worked out.

Having little technical knowledge of the group, my only excuse for troubling the Club with this note is a desire to aid others in a work which I cannot, from the pressure of different engagements, now prosecute myself as formerly. Moreover, I think such short notes are peculiarly adapted for presentation to the Entomological Club.

Mr. Lintner stated some experience in regard to this species. An attacked twig dies down at the upper part above the cut. From a half dozen twigs which had been marked at the time of the attack and cut and sent to him the following spring, he had obtained but one specimen of the Saw-fly, and this did not appear to agree with Fitch's description of *flaviventris*.

Mr. Smith remarked upon the difficulty of obtaining specimens of the sexes of twig borers, unless the entomologist was constantly in the field and himself cut them out of the infested wood.

Mr. Fletcher then read the following :—

REPORT OF COMMITTEE ON AN ENTOMOLOGICAL CONGRESS IN 1893.

Doubtless all agree that the meeting of this Club and that of the Association of Economic Entomologists in 1893 may afford unrivalled opportunities for us to meet and make the acquaintance of many foreign entomologists; that the occasion may afford excellent opportunities to make known our own methods and to extend a knowledge of the nature

and extent of entomological investigation being done in this country among those of other countries engaged in similar pursuits, and enable us to learn the same concerning them. In other words, our next annual meeting should be an occasion of great social advantage and of mutual scientific and practical benefit to ourselves and our visitors. To attain this should be our aim. The Association of Economic Entomologists and the Entomological Club of the A. A. A. S. have mutually pledged co-operation in this matter. A plan, therefore, for attaining the desired end is the question for present consideration.

The Committee, after due consideration, submit the following suggestions for your consideration and that of the Association :—

1. That the Executive Committee of this Club (understood to consist of its officers) shall be authorized to act for us jointly with an authorized body of the Association.

2. That as early as January, 1893, the Association concurring, a joint communication be sent to foreign entomologists and Entomological Societies generally inviting attendance, stating the nature of our meetings and soliciting papers and demonstrations for the same.

3. That members of both organizations be asked and urged to present examples of their best work in a finished state, illustrated as far as practicable by specimens, charts and drawings, and that the same be reported to the respective Secretaries in ample time for arrangement and the printing of a programme before the beginning of the meeting.

4. That the economic papers, regardless of authorship, be assigned to the meetings of the Association, and those of systematic or biological nature in like manner to the meeting of the Club. Visiting entomologists should, of course, be considered members for the time being.

5. That we believe an interesting feature would be an exhibition of uniques.

6. That the feasibility of a practical exhibition of apparatus and methods should be considered, and if possible instituted.

7. That a banquet in honour of our visitors should be made a feature of the meeting.

8. That the history of economic entomology in America should be treated by a competent hand.

9. That these propositions should be submitted to the President of the Association of Economic Entomologists.

D. S. KELLICOTT, Chairman.
L. O. HOWARD.
JAMES FLETCHER.

The report was adopted, and the officers of the Club were appointed a committee to issue a circular in regard to the Entomological Congress, inviting foreign entomologists to be present at the meeting of the Club next year.

The committee appointed in reference to the preparation of a Manual of Entomology reported progress, and, upon motion, were continued until another year.

The committee appointed to nominate the officers for the ensuing year reported as follows :—

President—Chas. J. S. Bethune.
Vice-President—H. G. Hubbard.
Secretary—C. L. Marlatt.

The report was adopted and the officers elected.

An adjournment was then taken until four p. m.

The Club assembled at four o'clock, and Mr. Weed read the following paper :—

NOTES ON THE INSECT FAUNA OF THE MISSISSIPPI BOTTOMS.

BY HOWARD EVARTS WEED, AGRICULTURAL COLLEGE, MISS.

Geographically the State of Mississippi is divided into what is known as the hills and the swamps. The hills comprise the middle and eastern portions of the State, while the swamps comprise the western border or the country adjacent to the Mississippi River, the larger portion of which is overflowed every year.

The insect fauna of this region presents many things of interest, there being an absence of many species found in other parts of the State, doubtless owing to the inundation and consequent drowning out in the spring of the year. Indeed, how it is that some of the species which are quite common in this region survive an overflow lasting from three weeks to two or over three months, I leave for others to explain.

As might be expected, in this region there are found but comparatively few species, but these in great numbers.

It was recently my privilege to visit this region, going by boat from Vicksburg to Greenville, and stopping off for about two weeks midway between these places at Mayersville, in Issaquena County. These notes are not intended to be in any way complete, and I will only mention a few of the more common species, which may be taken as a fair example of the midsummer fauna of this region.

Very few Hymenoptera are here found, and they are, indeed, conspicuous by their absence. Humble bees are exceedingly scarce, and this no doubt accounts for the fact that red clover does not re-seed in this region, as it dies out at least by the end of the third year from planting. But very few honey bees are kept here. The fossores are among the most common hymenoptera, *Pelopœus cementarius*, var. *architectus*, being especially common. Various species of *Vespa*, *Polistes* and *Halictus* are also common.

The Diptera are well represented in many families. The swamps of Mississippi are said to be the land of mosquitoes and gnats, which statement is quite true, the many low places and stagnant pools forming an excellent breeding place for the former, while the rapid running streams and bayous tributary to the Mississippi form a good breeding place for the latter at certain seasons of the year. The Muscidæ are very numerous, the common house-fly being an especial great pest. Very few screen doors and windows are here used, and in many cases the meals during the summer months are served in the open air upon a side porch. In this region during the summer of 1890 the Screw-worm (*Compsomyia macellaria*) was very destructive to live stock. During the past two seasons, while no cases of injury have been reported, yet the species is quite commonly seen, not only about refuse matter, but, like the house-fly, it is often to be found flying about the table at meal time.

Neuroptera are not common, *Libellula pulchella* being the only species of the larger dragon flies noticed.

Lepidoptera are not very well represented in this region. Among the butterflies several species of *Colias* are abundant, while *Catopsila eubule* and *Papilio asterias* are occasionally seen. The Noctuidæ are the most common of the Heterocera.

Nearly all the families of the Coleoptera are well represented in this region. As might be expected, the sandy shore along the Mississippi river is a most excellent place in which to collect Cicindelidæ. Boats plying the river are furnished with one or two electric lights, which are

only lit at the landings when freight or passengers are transferred. These lights attract many insects, including several species of Cicindelidæ, which may be easily collected on the deck under the lights. The most common species taken were *Cicindela repanda*, *C. hirticollis*, *C. punctulata* and *C. cuprescens*. These species are very common along the river shore, where the sandy strip, extending from the river's edge to the levees, forms an excellent breeding place for them.

The most common insect attracted by the electric lights is the Staphylinid *Bledius gularis*, which swarms upon the decks in countless thousands. By means of a small shovel I filled a large cyanide bottle full of this species in less time than it takes to tell it. Indeed, so common was the species that the electric lights were turned on only when actually needed at each landing, and by the time another landing was reached the decks would be nearly clear. Very often many of the specimens were trampled under foot and gave out a peculiar sickening odour.

Water beetles, especially the Hydrophilidæ, are very common. The family Heteroceridæ is exceedingly common, the most abundant species being *Heterocerus ventralis*, *H. undatus*, var. *limbatus*, and *H. pallidus*.

The only Coccinellidæ noticed were *Megilla maculata*, *Hippodamia convergens* and *Coccinella 9-notata*.

Cerambycidæ and Chrysomelidæ are especially common. *Lema peninsulæ* was so thick that large numbers would strike against a person when walking along the levees in the early morning. Flying with this species were large numbers of *Disonycha crenicollis* and *D. pennsylvanica*.

Orthroptera are fairly well represented by several species, the most common being *Scudderia curvicauda*, *Dissosteira carolina*, *Shistocerca americanum*, *Acridium obscurum*, *Melanoplus differentialis* and *M. atlanis*.

Hemiptera, especially Homoptera, are very abundant. Among the Heteroptera the most common species collected were *Amnestus pusillus*, *Metapodius* sp., *Leptoglossus phyllopus*, *Geocoris bullatus* and *Lygus pratensis*, while many species of Notonectidæ and Corisidæ were met with.

Many interesting species of Homoptera are to be found in this region *Cicada tibicen* is very common, while *Clostoptera xanthocephala* occurs in large numbers. Other common species are *Agallia 4-notata*, *Diedrocephala mollipes*, *D. versuta*, *Chlorotettix viridis* and *Homalodisca*

triqueta, while the types of Mr. Van Duzee's new species, *Anthysanus bicolor*, *A. obtutus*, *Deltocephalus flavocastatus*, were collected here, *A. obtutus* being especially abundant.

In reply to a question, Mr. Weed stated that he had found no Myriopoda in this region.

Mr. Smith remarked upon the difficulty of obtaining specimens of Lepidoptera from the Southern States. He also stated that some of the species figured by Mr. Abbott had remained unknown until quite recently, and that in the British Museum there were excellent drawings of species undoubtedly new, or, rather, undescribed, and which have not been since found.

Mr. Weed stated that he had been disappointed in regard to the southern fauna, it having been his experience that there were plenty of insects, but comparatively few species.

Mr. Cook followed with a paper entitled "Do Termites Cultivate Fungi?"

Mr. Hubbard mentioned some of his observations upon Termites in Jamaica, which have been published in the Boston Society of Natural History.

Mr. Cook thought that the so-called fungi masses were only the wood which had been eaten or gnawed off by the Termites. Old Termites do not appear to have anything to do with these masses. The masses of fungi are about four or five inches through, and are not found in the central part of the hills.

Mr. Hubbard stated that these were different from those which he had observed in Jamaica.

The Secretary then read the following paper:—

THE WEB-WORM TIGER (PLOCHIONUS TIMIDUS, HALD).

BY MARY E. MURTFELDT, KIRKWOOD, MO.

It would seem appropriate that this hitherto somewhat rare and inconspicuous little carabid should be brought to the notice of the Entomological Club of the A. A. A. S. in its new *role* of a benefactor.

I have been observing its habits for two years, and am confident that to it, more than to any other agent, do we, in the neighborhood of St. Louis, owe our present comparative freedom from the Web-worm nuisance. Whereas formerly almost every other tree would, at this season of the year, be infested with one or more of the disfiguring nests,

they are now so few and far between that it requires some search to find one. I was particularly struck with the difference, in this respect, between this section and the Atlantic slope, on my journey to Washington last August, the eastern woods and orchards being in many places almost defoliated and presenting a very unhealthy and unsightly appearance from the ravages of this insect.

It is impossible, of course, to ascertain just when or how the beetle under consideration acquired the habit of preying upon the Web-worm; but I think it could not have been much previous to its discovery. In 1888 *Hyphantria* was abundant in Kirkwood, and for the purpose of obtaining fresh specimens of the moth, as well as of its usual parasites, I transferred a colony from a box elder tree to the rearing cage. From these a large number of perfect insects were bred and also parasites of two or three species, but no larvæ or imagines of *Plochionus* were observed.

Early in June, 1890, I had been struck with the wasting away of one or two colonies of *Hyphantria* and was about to examine into the causes, when I received from Mr. J. C. Duffey, the Horticulturist of the Shaw Botanical Garden, a note informing me that larvæ of a small carabid had been found in a nest of Web-worms, upon which they were evidently feeding. Accompanying this communication was a box containing one of the infested colonies. Unfortunately the box had been broken in transit, and when I called for my mail the Web-worms were pervading the office, and the distracted postmaster was engaged in a vain attempt to confine them in a newspaper, and expressing himself with some emphasis concerning the sort of mail posted by entomologists. Undoubtedly many of the predaceous larvæ escaped with the caterpillars, but upon examination, after reaching my study, I found seven or eight of the larvæ in the fragments of the web and a sufficient number of Web-worms to afford them sustenance. Placing them on fresh leaves in a small rearing cage on my desk, I soon had ocular verification of Mr. Duffey's interesting observations.

The *Hyphantria* larvæ had all passed the last moult and many were nearly full grown; the carabids were also nearly mature, varying in length from one-fourth to one-third inch, somewhat alligator-shaped, the head provided with sharply pointed trophi, with rather long and strong legs, the body above dark and horny; they had quite a formidable aspect. By preference this larva attacks its victim from the front, biting into the

under part of the thoracic segments ; but in many cases I have seen it seize hold of the side of a caterpillar, into which it would soon almost bury its head, and not the most violent contortions on the part of its prey were of avail to dislodge it. By the time its appetite was appeased the Web-worm would be fatally injured, and a fresh one would be required for its next meal. In this way one beetle larva was capable of destroying a great number of the worms in the course of its development. The two species, web-worm and carabid, reach maturity about the same time, the period of carabid adolescence being about one week less than that of the insect on which it preys. The change to pupa takes place both on the surface of the ground and in the remnants of the web on the tree—in the latter case it (being very soft and white and not enclosed) is subject to destruction by birds and other insects. The beetle appears in from eight to ten days after the change to pupa, and requires a day or two to acquire its dark brown colour and the firmness in texture of maturity. It is very swift and furtive in its movements and remains hidden as far as possible during the daytime, but is, even in the rearing cage, quite active at night, using its wings freely. It feeds, sparingly, on aphides and similar soft insects. This season I found it in considerable numbers in the two web-worm nests that occurred in our orchard, and to test its destructive capacity I placed thirty-six three-fourths grown *Hyphantria* larvæ in a large glass jar, with three nearly mature *Plochionus* larvæ. A large number of the caterpillars were killed in the course of the following week, and from the three dozen larvæ I bred seven parasites (*Meteorus hyphantriæ*) and but three moths ; the remainder had evidently succumbed to their coleopterous foes, all three of which developed into fine beetles.

In respect to Mr. Duffey's wish to present the first published account of this insect, I refrained from mentioning it to the Club at the Indianapolis meeting, but referred to its valuable services in my notes for the Division of Entomology of the same year. Early in the autumn, 1890, Mr. Duffey read a paper on this insect and its interesting habits before the Academy of Science of St. Louis, giving its history somewhat in detail, and also technical descriptions of the adolescent stages, accompanying these with some tolerable illustrations. This paper was published in the Transactions of the Academy the following February, and renders it unnecessary for me to describe the larva and pupa more minutely.

I believe the perfect insect occurs sparingly in many sections of the country, but it may not in every locality acquire the habit of preying on

Hyphantria. It is to be hoped, therefore, that the divergent type will slowly spread from State to State until it, in connection with other predaceous and parasitic species, will practically relieve us of one of our most prominent arboreal pests.

Mr. Schwarz stated that it was rather singular that this habit of the species had not been hitherto noticed.

The Club then adjourned.

HOWARD EVARTS WEED, *Secretary*.

The following papers were not received by the Secretary in time for insertion in their proper places:—

GALERUCA XANTHOMELAENA POLYGONEUTIC AT WASHINGTON.*

BY C. V. RILEY.

It will be remembered that at the meeting of the Club a year ago, Professor J. B. Smith gave the results of his observations for that year upon the Elm-leaf Beetle at New Brunswick, N. J., and concluded that it was single-brooded there. His observations were so carefully made that his conclusions could not well be doubted; yet they did not agree with those made at Washington, where the species had been found to be at least double-brooded. In the article which I had published upon this insect in Bulletin 6 of the Division of Entomology of the Department of Agriculture, I had discussed the evidence as to number of broods, both from European sources and my own experience; but Professor Smith's observations were so conclusive, so far as his locality is concerned, that I felt the need of more accurate notes than any that had been published hitherto, and of the desirability of settling the question as to number of broods at Washington by a series of carefully-planned indoor experiments, where, by breeding from one generation to another, there could be no question of an erroneous conclusion. This I have done, and have communicated from time to time the results to Professor Smith, who has also communicated his to me, and in a general way I may say that the work at each point, so far as I have heard from Professor Smith up to July 28th, appears to bear out the previous conclusions and experience at either point. In short, Professor Smith finds the species to be single-brooded in New Jersey this year, whereas at Washington it is double-brooded as a

*See page 245.

rule, and produces at least a third and probably will produce a fourth generation, by exception.

During the first week of May of the present year the beetles were abundant, and by the 6th of May the first eggs were found. By the 20th of the same month the eggs were hatching, and by June 8th the first pupæ were obtained. By June 12th the bulk of the larvæ had transformed to the pupa state, and by June 18th, in the vivarium, the second generation of beetles (or first bred of the season) began to appear, and were in great numbers by the 20th of the same month. Before the end of the month of June most of the second brood of beetles had issued and eggs from this second brood were obtained in numbers and were numerous out of doors wherever the leaves had not been already ruined. Yet up to this time belated larvæ of the first generation were yet to be found. By the 15th of July the second generation of beetles began to get scarce and to perish in the vivarium. By the 18th of July the first pupæ of the second generation were observed, and the bulk of the larvæ were descending the trees. Nevertheless, at the same time and up to the 26th of July, there were eggs and larvæ of all sizes yet to be found of this second generation. During the last days of the month, these larvæ of all sizes were everywhere crawling about, having defoliated the trees. The third generation of the beetles in the vivarium began to appear on the 27th of July, exactly 27 days from the egg, and during the first ten days of August the eggs were obtained in the vivarium from this third generation of beetles. To sum up, the larval period of the first generation lasted from the third week in May to the end of June, the bulk transforming to the pupa state about the middle of June, the hibernated imagos being scarce or absolutely unseen during the month of June. The beetles of the second generation began to appear about the middle of June and were in force during the third week of that month, while yet a few larvæ of the first generation were to be found. By the end of June most of the second generation of beetles had issued, and the eggs of these were numerous where the leaves had not been previously destroyed. By the middle of July the imagos of the second generation became scarce, and during the third week of the month the bulk of the larvæ of the second generation were descending the trees. Some pupæ were formed, and a few of the eggs and larvæ of all stages were yet to be seen. By the last of July the third generation of beetles began to appear, and continued to issue during early August. The eggs of this third generation are laid only on fresh leaves.

Thus, as stated, there can no longer be any question that the species at Washington is double-brooded as a rule, and that it produces exceptionally a third and even a fourth generation. Yet during the latter part of July we have at Washington very much the same condition of things in the abundance of the larvæ and the injury of the trees from the second generation as they have at New Brunswick, N. J., from the first generation. I give below a detailed record of the observations made the present year, as noted by Mr. Theo. Pergande, who had charge of the experiment, though I have personally watched over and superintended the breeding and can confirm the accuracy of the record. Before leaving the subject, it may be well to note that in the fourth edition of the European Catalogue of Coleoptera, as pointed out to me over a year ago by Mr. John Hamilton, the nomenclature of this species is given as follows :

Galeruca luteola Müll., Mil. Turin 3, 187.
xanthomelæna Schrank, Ws., 627.
calmariensis Fab., Gyll. Ins. 3, 508.

There seems no other course than to follow the resurrectionists and to change the name that has already become so familiar to us once more in favor of *luteola*, unless we hold by the 20 years limit promulgated and discussed in the rules for entomological nomenclature considered in the early history of this Club.

STATEMENT OF EXPERIMENTS WITH THE ELM-LEAF BEETLE.

HIBERNATED OR FIRST GENERATION OF BEETLES.

May 3, '92.—Beetles now swarming and quite abundant on some of the Elms on the grounds of the Department of Agriculture, eating the characteristic round holes in the leaves.

May 6, '92.—First eggs noticed.

May 20, '92.—A few batches of eggs hatching. A lot of young larvæ are placed in vivarium. Marked also 8 colonies for outdoor observation.

May 27, '92.—Larvæ are casting first skins.

June 6, '92 —Larvæ are casting the second skin.

June 8, '92.—One Larva has changed to pupa. Larvæ on branches which were marked, May 20th, are leaving and descending the trunk. There are still great numbers of larvæ on the trees, some of them still in second stage. Placed a considerable number of larvæ in separate vivarium.

June 12, '92.—Most all larvæ in vivaria have changed to pupæ.

June 16, '92.—There are still a considerable number of larvæ on the trees. All are about full-grown. No beetles so far. Plenty of pupæ around base of trees.

SECOND GENERATION OF BEETLES.

June 18, '92.—Two beetles issued to-day from the lot in vivarium. None to be found out doors so far. Apparently the last of the larvæ are now descending the trees. Pupæ are present in heaps around base of trees. Placed a lot in breeding cage to obtain beetles.

June 20, '92.—To-day 51 beetles issued from lot in vivarium. Placed them all with a branch of Elm to permit feeding and breeding. Examined the trees but failed to find any of the beetles. There are still a few of the larvæ feeding.

June 21, '92 —Noticed the first few beetles on the trees; there are still some larvæ.

June 22, '92.—Beetles have become somewhat more numerous, particularly on the last tree at the east entrance. Found also a few batches of recently deposited eggs. Separated these in another vivarium.

June 24, '92.—Large numbers of beetles are issuing; eggs are still very scarce. Beetles are feeding on leaves, eating small holes. There are still a few larvæ of the first generation.

June 25, '92.—There are still a few larvæ. Beetles have become quite numerous, though eggs are still very scarce.

June 27, '92.—Eggs are still scarce on the trees. Beetles in vivarium have deposited quite a number of eggs.

June 30, '92.—Beetles have become very numerous, and have almost ruined the leaves on one tree. The majority have now issued. They do not like to oviposit on the trees on which the leaves are nearly ruined, but eggs are now already quite numerous on all other trees, the foliage of which, so far, is but slightly injured.

July 2, '92.—Nearly all beetles have issued. Plenty of eggs have been deposited by them on some trees, so that often 5-7 egg-masses are deposited on one leaf. On other trees, on which the beetles are also plentiful, extremely few eggs can be found.

THIRD GENERATION OF BEETLES.

Eggs in vivaria, both those taken out doors and those obtained in breeding cage, are hatching.

July 8, '92.—A number of beetles died. No eggs deposited.

July 15, '92.—Beetles are getting very scarce.

July 18, '92.—Some of the larvæ in cages have changed to pupæ, just seventeen days since hatching of the eggs.

July 19, '92.—The oldest larvæ are already descending the trunk of the trees. There are still a few beetles to be seen, also quite a number of unhatched eggs, some of which have been but recently deposited; also larvæ in different stages, from the youngest to the oldest.

July 22, '92.—Larvæ are descending the trunks by thousands; large numbers are heaped up between tufts of grass, ready to change to pupæ. There are still some beetles on the trees; plenty of unhatched eggs and larvæ in all stages of growth. Badly infested trees look as if scorched by the sun; leaves are dropping.

July 26, '92.—Some trees are now almost bare of leaves, most of them having dropped. Larvæ of all sizes are running about on branches and trunks; those which are full-grown go to the ground to transform, all others are doomed to die of starvation. No more beetles to be seen. There are already plenty of pupæ and huge piles of larvæ around badly infested trees.

July 27, '92.—Beetles are issuing in vivarium ten days after changing to pupæ.

July 30, '92.—The first beetles of this third generation are issuing out doors. On some of the trees which yet have leaves there are still a considerable number of larvæ in different stages of development.

Aug. 1, '92.—Considerable numbers of beetles have issued to date, both out doors and in vivarium. Larvæ of all stages are still crawling about on trunk and branches. Younger larvæ are still feeding on remaining leaves. Beetles are also feeding.

Aug. 3, '92.—Beetles are issuing in large numbers, and are migrating to the trees on which leaves are still present; none to be seen on defoliated trees. There are still numbers of larvæ in the last two stages on some of the trees. Pupæ and larvæ are piled up under some of the worst infested trees to the depth of about one inch.

FOURTH GENERATION OF BEETLES.

Aug. 3, '92.—Found to-day out doors five small batches of eggs, which will produce the third generation of larvæ, and are doubtless deposited by beetles of the third generation. None are deposited so far in the vivarium. Large numbers of the lower layers of pupæ are dead and have commenced to rot, evidently on account of the recent rains and excessive heat.

Aug. 5, '92.—Beetles are swarming in large numbers, the air is full of them. There are still numerous pupæ and larvæ ready to change. Numbers of larvæ are still feeding; most of them are about full grown. Eggs are still rather scarce. None have been deposited, so far, in the cages. There are now millions of beetles on the trees; the remaining leaves will, therefore, be soon consumed. Eggs are still scarce, though batches of them are scattered over the trees; there is scarcely a chance for larvæ of the third generation to develop. There are still thousands of pupæ and also some larvæ of the second generation. Eggs found August 3rd have already hatched.

Aug 9, '92.—The majority of beetles have now issued. There are still a few larvæ. The denuded trees will soon have new leaves. Eggs are still scarce. Beetles in cages have commenced to deposit some eggs.

Aug. 11, '92.—Nearly all beetles have issued. There are still a few larvæ of second generation to be seen. Eggs (third generation) have become somewhat more numerous, especially on some young shoots, which are completely covered by the beetles. Leaves are appearing on some of the denuded trees.

ON DEMODEX FOLLICULORUM VAR. BOVIS IN AMERICAN CATTLE.—*

BY C. W. STILES, PH. D., WASHINGTON, D. C.

In most books which treat of *D. folliculorum*, considerable space is given to a description of the lesions it produces in man, dogs, cats and sheep, while its presence on cattle is simply mentioned with the remark that Claus and Gros state that it is occasionally found on these animals.

Gros seems to be the first who observed it on cattle. His original article is not at my disposal, but I quote from Blanchard.

*See page 245.

Walter Faxon† added an interesting contribution to our knowledge on this subject, when he described some pits and pimples found in the skin of cattle and caused by the presence of the parasite in question. Faxon's paper seems to have remained unknown to most authors, while a few who have evidently seen it ignore it, with the remark that the description and figures are so poor that no confidence can be placed in it. Only a few authors have accepted his results.

While forced to admit that from a zoological standpoint Faxon's paper is not all that could be desired, I believe it should have received more attention than has been given to it, and I am now in position to support Faxon in his statements.

This past winter and spring Pfister and Vogel have sent to the Hon. Secretary Rusk several hides which were covered with "pimples" or pustules, and which, according to their letters, have been noticed occasionally in former years, but never in such alarming frequency as this year.

The hides were referred to me for examination, with the following result :—

They were dotted with numerous swellings about as large as a pea, and with numerous small punctures about the diameter of a pin.

Upon opening the swellings it was found that they contained a granular mass, which, owing to the preparation through which the hides had passed, was greatly changed histologically ; besides the granular substance there were immense numbers of *D. folliculorum* var. *bovis*. The parasites were easily recognizable, but were too macerated to warrant my giving figures of them in this note. The punctures were evidently the entrances to hair-follicles, while the lumen of the pimples evidently represented enlarged hair-follicles, the enlargement being due to the immense numbers of the parasitic mites present.

Dr. Michener requested Messrs. Pfister and Vogel to informs us in regard to the frequency of these pimples in hides which came through their hands, and received the following reply :—

"Milwaukee, Wis., April 28, 1892.

"Dr. C. B. Michener, Asst. Chief, Bureau of Animal Industry, Washington, D. C.:

"DEAR SIR,—Yours of the 22nd inst. received, and we are very thankful for the information you have furnished us. We have had such a variety of opinions on just what

†On the Presence of *Demodex folliculorum* in the skin of the Ox : Bulletin of the Museum of Comp. Zool. of Harvard College, Cambridge, Mass., 1878. Vol. 5, No. 2, p. 11-16. 1 Pl. with 9 figs.

was the cause of these troubles that the result of your researches is very gratifying to us, as we were in the dark whether the cause was not some fault of ours in the manufacture of the leather. You asked at what time of the year this trouble appears. We have noticed it at all seasons, but had a remarkably large percentage of it in the hides received during the months of September, October, November and December of last year.

"We have found it in hides that were bought in St. Paul, Chicago, Kansas City, but think we noticed it more in hides from the southern districts. The damage to the hide is a severe one, being fully 20 per cent. Taking 50 pounds as the average weight of country hides it would amount to 50 cents per head, which, of course, in the aggregate is an immense loss to the tanning interest.

"Yours very respectfully,

"(Signed) PFISTER & VOGEL LEATHER CO.,

"Per Fred Vogel, Jr., Mngr."

It will be seen from this letter that this parasite occurs on cattle much more frequently than has hitherto been supposed.

It would of course be extremely difficult to treat a herd of cattle affected with this parasite. Several authors recommended the same treatment for cattle which is used in cases where dogs are affected with the same parasite. Prevention, however, can effect a great deal, and as soon as the mites are noticed on an animal, the latter should immediately be isolated from the herd.

Bureau of Animal Industry, Washington, D. C.,
July 1, 1892.

Postscript.—Prof. Riley in personal conversation with me suggested the use of kerosene emulsion to destroy these parasites. The emulsion is certainly worth trying, but I must confess I have not much confidence that it will prove as effectual against these mites as it has against other arthropode parasites. Experience has shown that nothing short of a thorough rubbing in of whatever is used (benzine, carbonate of potash, green soap and all the rest of the remedies recommended in various books) will destroy the hair-follicle mite.

In the discussion which followed the presentation of the paper before the Entomological Club, the other varieties of *Demodex* were mentioned, and at the request of several members of the Club I append below the measurements (in mm.) of the varieties in question [compiled from Meguin, Railliet, Neumann, Zürn].

1. *D. f.* var. *hominis*.

Female: length..... 0.40
rostrum.....0.02 long, base 0.03 broad.
thorax..... 0.09 by 0.04

Male: length 0.30
rostrum, same as in female.
thorax..... 0.085 by 0.04
First larva (apode):..... 0.06 by 0.04
Second larva (apode)..... 0.08 by 0.06
Hexapode larva:..... 0.12 by 0.05
Octopode larva:..... 0.36 long.
Ovum:..... 0.06–0.08 by 0.04–0.05
rostrum + cephalothorax=one-third to one-fourth of the total length of the body.

2. *D. f.* var. *canis.*
Female: length..... 0.25–0.30
rostrum.....0.03 long, base 0.03 broad.
thorax..... 0.10 by 0.045
Male: length 0.22–0.25
rostrum same as in female.
thorax ..... 0.095 by 0.045
First larva (apode) :..... 0.06–0.09 by 0.015–0.025
Hexapode larva: ..... 0.11 by 0.032
Octopode nymph:..... 0.19 by 0.04
Ovum:..... 0.07–0.09 by 0.025
rostrum + cephalothorax=slightly less than one-half of the total length of the body.

3. *D. f.* var. *cati:*
Similar to var. *canis*, but one-fourth smaller.

4. *D. f.* var. *caprae.*
Female:..... 0.23–0.25 by 0.06–0.065
Male:..... 0.22–0.23 by 0.05–0.055
Ovum:.....0.068–0 08 by 0.032–0.045
rostrum + cephalothorax=nearly one-half of the total length.
Causes a disease in goats similar to that described above in cattle (Nocard, Railliet).

5. *D. f.* var. *ovis.*
Said to differ from var. *hominis* in having a broader rostrum and cephalothorax (Oschatz).

6. *D. f.* var. *equi.*
E. Wilson says it is identical with var. *hominis.*

7. *D. f.* var. *bovis.*
length..... 0.2

The material in my possession at present does not warrant my giving exact measurements. Faxon's figures show that the abdomen is shorter and broader than that of var. *hominis*, and slightly less than two-thirds of the entire length. The form is more like that of var. *canis*, and I should not be at all surprised if a study of fresh material would result in the conclusion that var. *bovis* is simply a diminutive form of var. *canis*, and that the cattle originally became infected from contact with dogs. This is, however, mere speculation.

8. D. f. var. *suis*=*D. phylloides*, Csokor, 1878.

Female:.....0.24–0.26 by 0.06–0.066
Male:..... 0.22 by 0.05–0.057
Hexapode larva:..... 0.13–0.14 long.
Octopode larva:..... 0.22–0.28 long.
Ovum:..... 0.10–0.11 by 0.034

rostrum + cephalothorax=about one-half the length of the body.

As I stated in the discussion, in answer to a question, this form is totally different from var. *bovis*, having an extremely pointed abdomen. It is so different, in fact, that Csokor described it as a new species; most authors admit it only as a variety. Personally, however, I rather incline towards Csokor's opinion.

NOTES ON THE BEAN WEEVIL.*

Professor Riley gave some verbal notes on the above subject, covering substantially the facts in articles recently published in the *Canadian Entomologist*, and an editorial prepared for the first number of Volume V., *Insect Life*.† Both the Bean Weevil and the Pea Weevil were found to have temporary thoracic legs of a peculiar form in the post-embryonic larval state, and also certain prominent spines on the prothoracic shield. The eggs of the Bean Weevil in the field are not attached to the outside of the pod, as had hitherto been stated and believed, but are laid in masses within the pod, through an aperture made by the jaws. In the green pods this aperture must frequently close up, so as not to be noticeable, as pods which were brought in from the field showing

*See page 255.

†Canadian Entomologist, August, 1892, Vol. XXIV., No. 7, p. 185.
Insect Life, Vol. V., No. 1, p. 27.

no trace of puncture gave out large numbers of Weevils, but in the drier pods the aperture remains and often takes the form of an elongate slit along the ventral suture. More often, however, the eggs are thrust into the more mature pods through the natural opening, as the pods dehisce. In reference to nomenclature, Professor Riley confirmed the position he had taken in 1870 that our Bean Weevil is not *Bruchus obsoletus* Say, this species having been rediscovered by Mr. Schwarz on *Tephrosia virginiana*. Our Bean Weevil, he concluded, must be known in future as *Bruchus obtectus* Say.

AN ADDITIONAL NOTE ON THE BEAN WEEVIL.

BY C. V. RILEY, PH. D.

In the note on the post-embryonic larvæ of the Pea and Bean Weevils, published in the August number of the *Canadian Entomologist*, (p. 185), I have stated that the eggs of the Bean Weevil "are primarily laid upon the bean pod in the field, but chiefly, if not entirely, upon those which are already matured and ripening." This statement was based upon the finding of the eggs upon more mature bean pods in years gone by, and represents the current belief hitherto held. A more careful examination of the eggs thus found the present season, after the note above referred to had been sent to the editor, showed that they did not entirely agree with the eggs of the Bean Weevil as laid on stored beans, the difference being sufficient to justify a doubt as to the former being those of the ordinary Bean Weevil, and to cause me to look into the matter more fully, which I have done in my own garden the past summer. The facts resulting have been recorded in *Insect Life*, Vol. V., No. 1, page 32, and they show that the eggs hitherto taken for those of the common Bean Weevil are, without much question, those of another Bruchus, either *Bruchus quadrimaculatus* Fab. or *B. scutellaris*, both of which infest beans. The eggs of our common Bean Weevil (*Bruchus obtectus* Say) are thrust into an aperture made by the jaws of the parent Weevil, generally along the ventral suture near the funiculus, or else are laid in clusters on the inside of the pod, wherever this is sufficiently ripe to cause a partial opening. In the field the aperture must be made early enough to permit more or less perfect closing by growth of the pod; whereas on mature pods it is often quite elongate and does not close.

I have also shown, in the article above alluded to, that our Bean Weevil should be known in the future as *Bruchus obtectus* Say, and not as *B. obsoletus* (Say) Horn, Mr. E. A. Schwarz having obtained what agrees entirely with the description of *obsoletus* upon *Tephrosia virginiana* in connection with *Apion segnipes*, which was also found upon the same plant (Say having found the two species associated on the same Astragalus), while the description of *obtectus* Say, so far as it goes, agrees very well with our Bean Weevil, that of *obsoletus* not agreeing, as was shown in my Third Report on the Insects of Missouri (1870). The synonymy of the species, chronologically, would stand thus:

1831—Bruchus obtectus Say.
1833—Bruchus leguminarius (Chevrolat) Gyll.
1839—Bruchus irresectus (Schönherr) Fahræus.
1839—Bruchus pallidipes (Chevrolat) Fahræus.
1854—Bruchus subellipticus Wollaston.
1861—Bruchus fabæ Fitch.
1867—Bruchus breweri Crotch.
1871—Bruchus fabæ Riley.
1873—Bruchus obsoletus (Say) Horn.
1889—Bruchus subarmatus Janson (?=subarmatus Gyll.).

FENISECA TARQUINIUS.

Mr. S. H. Scudder, in his "Butterflies of Eastern U. S." states that "*Feniseca Tarquinius*" has never been captured east of the Connecticut Valley in Massachusetts. Other writers mention it as rare in New England. It may interest some of your readers to know that I found it *very common* on the Glen Road near Jackson, N. H., in the second week in June. I also found a specimen on a window of the Boston Athletic Club, which seems a strange place for it. The building is on new made land, nowhere near any alder growth, in fact, in the city. I have collected a number of years in the suburbs of Boston, but have never seen a specimen.

Chestnut Hill, Mass. A. G. Weeks, Jr.

Mailed November 5th.

The Canadian Entomologist.

VOL. XXIV. LONDON, DECEMBER, 1892. No. 12.

NOTES ON COLEOPTERA—No. XI.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Baptolinus pilicornis, Payk.

Till lately this species has been known in our literature as *B. macrocephalus*, Nord. It has a very wide distribution across the northern part of the continent, from Alaska to New Hampshire, and through the Alleghanies as far south as southern Pennsylvania, and probably much further. In Europe it ascends to 68°, and is spread over all Siberia to the Amur. It does not seem to be abundant anywhere. It is very variable in colour, and to some extent in the fineness or coarseness of the general punctuation. I took two examples here recently under the bark of a moss-covered decaying oak, and several a few days afterward on the mountains, in the same situation. All these are black and shining, with the mouth parts, antennæ and legs pale, corresponding to the description of Paykull's type. Four examples from Vermont have the mouth parts and the antennæ rufous, and the elytra rufous, grading imperceptibly to rufo-piceous at the apex and sides. One example from Prince of Wales Island, Alaska, seemingly mature, is altogether pallid, except that the last abdominal segment and the outer hind angles of the elytra are fuscous, the general punctuation exceedingly fine, and the length only .15 inch (normal .20-.25 inch). *B. macrocephalus*, Nord., which occurs at Sitkha, is still different as described by Mannerheim, who says it has three punctures on each side of the thorax, whereas those above mentioned have but two. In Europe there are two other species listed, though by what characters they are separated I am not aware, but they are certainly very close to *pilicornis*. One of these, according to Mr. A. Fauvel (Rev. Entomolog. V. 117), *B. longipennis*, Fauv., occurs in Canada and New York, and inasmuch as he does not mention *B. pilicornis* as American, it is not improbable both species are confounded here, and perhaps *affinis*, Payk., which is as widely distributed in Europe and Asia as *pilicornis*. The thorax in *pilicornis* is exceedingly smooth and polished, with two minute setiferous punctures on each side—one near the anterior angle, and the other near

the middle of the disk ; and here is a difficulty in referring it to the proper genus by the classification, in which it is said the thorax in the *Xantholinini* has " rows of punctures, of which the outer ones are curved."

Lathrobium armatum, Say.

Like the foregoing, this species varies greatly in coloration, which seems to be racial. Say described it from an example taken in Indiana, which had the elytra entirely dark, as have my examples from Illinois. As it occurs here, the apical half of the elytra is rufous, and no typically coloured example has been taken, though the individuals are numerous, inhabiting with mosquitos certain damp alluvial places overgrown by rank vegetation. The colour of the legs in both forms is usually bright rufous, that of the antennæ ferrugineous to brown, and the ♂ sexual characters are identical. The species likewise occurs in Ohio, West Virginia, Wisconsin, Michigan and Canada.

Bledius ferrugineus, Lec.

Is found along streams in wet, loamy places inhabited by *Heterozerus* and other mud insects. If it forms any galleries they cannot be distinguished from those of the other occupants ; pouring water on such places will frequently induce them to appear on the surface. The variety which occurs here is the typical, as described by Dr. Leconte, which has a shining black head and thorax, and the elytra bright ferrugineous, with the suture and scutellar region piceous. Length, .18 to .23 inch.

Bledius stabilis, Casey.

This species when found is abundant ; it lives in moist, grassy, compacted places on the banks of streams, and frequently at some distance from water. Its presence may be known by the surface galleries it constructs for a habitation. The individuals vary in the colour of the elytra about equally from piceous-red (perhaps from immaturity) to piceous-black, and average about .15 inch in length. July and August.

B. emarginatus, Say.

This beautiful little Bledius occurs everywhere in countless multitudes on damp, loamy places along streams near running water in July and August. These and an occasional example of *annularis* are the only species of the genus which have been observed here as yet ; with *emarginatus* occurs, but less abundantly, the minute *Trogophlœus uniformis*, Leconte, about .05 inch in length, and dark coloured throughout. It constructs surface galleries, and behaves like the preceding. Having no, or scarcely visible, dorsal thoracic impressions, it strongly resembles, a small *Bledius*.

It is closely allied to *T. convexulus*, Lec., a salt-marsh species of the Atlantic coast, which has the same habits. *T. decoloratus*, Casey, is the species of this genus next in abundance here, and is likewise minute, being from .06 to .08 inch in length. It inhabits very wet places along streams and swamps. It does not seem to construct galleries, but is sheltered by any kind of *debris* and the holes made by other mud insects. The most of the individuals have the elytra rufescent, with a dark shade near the base and suture, but occasionally one occurs in which they are piceous. The ♀ ♀ are very well described by Mr. Casey, and his description of *T. incertus* seems to apply quite well to the ♂ ♂, which have the head parts more developed. *Incertus* in that case will, according to custom, be the name of the species.

T. spretus, Casey,

Is found with the preceding, appearing to have the same habits, but is much less abundant. It is piceous, with pale legs, and about .11 inch in length.

T. quadripunctatus, Casey (?) Say.

This species is found with the preceding two. It is much larger than *spretus*, and less abundant. Examples of this species may have been formerly distributed as *memnonius* from a bought and wrongly named type.

T. congener, Casey,

Has the habits of the preceding, with which it is found. Only a few examples have yet occurred. It is entirely piceous, about .10 inch in length, and is readily known by the thorax being quite convex, and the dorsal impressions uninterrupted. The foregoing are all the species of this genus detected here as yet, but the exploration can not be considered exhaustive. The collecting and studying of these minute insects in one's local fauna will be found quite fascinating when rightly set about.

Eleusis nigrellus, Lec.

Two examples were taken under the bark of maple, June 15th, identical with others from California.

Siagonum punctatum, Lec.

Many examples were taken with the above, and I have it from North Carolina and New Mexico; it also occurs in Arizona and British Columbia.

Corymbites caricinus, Germ., *lobatus*, Mann. (Bull. Mosc., 1843, 243), *telum*, Lec.

This species is characterized by having an elongated thorax rather densely and finely punctured above and below, with the hind angles produced and non-carinate; the antennæ are elongate in the male, serrate in both sexes from the 2nd joint, the 3rd and 4th being subequal. My examples from Queen Charlotte and Vancouver Islands are dull black, and no colour variations are recorded. Unalaschka, Oregon.

C. umbricola, Esch., Mann. (Bull. Mosc., 1843, 242).

This species in some way has become a synonym of *caricinus*, which it resembles by its elongate thorax and parallel form; but here the likeness ceases. The thorax is more coarsely and sparingly punctured above and below, though somewhat densely on the sides above; the hind angles are produced divaricately to a point, and are finely, conspicuously carinate, and blood red. The antennæ (males only seen) are elongate and serrate from the 2nd joint, the 3rd being notably longer than the 4th. All the examples seen are shining black, with a metallic lustre, and only one colour variation is recorded in which the hind angles of the thorax are fuscous. Sitkha, British Columbia. My examples are from Queen Charlotte Island.

C. lobatus, Esch.

This species has been placed in synonymy with *caricinus*, evidently by oversight, because in his comparison (Bul. Mosc., 1846,) Mannerheim distinctly states that *lobatus* has the hind thoracic angles carinate. I have seen no examples of *lobatus* with which to compare *umbricola*, but Mannerheim gives so many points of difference that it is not obvious why they should be united; both were described at the same time and on the same page. Mannerheim gives six colour variations for this species, and the distribution Unalaschka, the island of Kadjak, the peninsula of Kenai, and the island of Sitkha.

Tragosoma depsarium, Linn., *Harrisii*, Lec.

The European and American forms are here united, for reasons which will appear. An example was taken in this locality this season; it is widely distribted across the northern part of the continent, from Newfoundland to Vancouver Island, and through the Rocky Mountains into New Mexico. The punctuation of the thorax is much denser and finer in examples from Canada and the Rocky Mountains, than in those from the Pacific coast, in many of which the punctures are well separated. Each

puncture supports a hair, and, curiously enough; the finer the punctures, the longer are the hairs, so that the Pacific coast females, with comparative sparse punctuation, are not conspicuously hairy. European examples are before me which are in no way distinguishable from those taken on the Pacific coast. To what extent individuals vary in Europe is unknown, but, regardless of sex or locality, there is much variation here. The following observations are made from a study of about 30 examples from Canada, Custer and Conejos counties, Colo.; Las Vegas Hot Springs, New Mexico, and various places on the Pacific coast, namely: The eyes are not uniform in size, depth of emargination, nor distance apart either above or below; the same joints of the antennæ are not always of the same length, and their united length is much greater in some individuals than in others; the antennæ differ also in the degrees of compression, coarseness, fineness and density of punctuation, while in some examples the outer joints seem glabrous; in others there is an evident microscopic pubescence; the thorax is variable in every way, and in few examples is there more than an approximation in every respect; the degree of angulation of the sides of the thorax varies from very strongly defined to scarcely any, and in some examples the angular point is before the middle in others behind it, while in the majority it is about the middle of the margin; the thoracic spine at the angle may be small or large, obliquely vertical, or sometimes directed anteriorly or posteriorly; the margin of the thorax behind the spine is narrowed in some individuals by a straight line, till it meets the margin of the base in nearly a right angle; in others it is either sinuate or arcuately rounded, forming no angle at its conjunction with the base; the surface may be nearly equal with a dorsal channel, more or less deep, but usually it has many irregular inequalities; the punctuation varies from the exceedingly dense (almost granulate) and rather fine, to that which is sparser and coarser, with the punctures well separated. The scutellum is also variable, sometimes large and equilaterally triangular, and again transverse and rounded at apex. There are no well defined races. The species is widely distributed through eastern and western Siberia, the countries along the Amur, and the mountainous parts of Central Europe.

Another species of *Tragosoma*, in some American collections for many years, has lately been described by Mr. T. L. Casey, from the male, under the name *spiculum;* of this I have not seen the female, which is probably Mr. Casey's *pilosicornis*, in which case, if the locality is correct,

this species extends from New Mexico to the coast range in southern California.

Hylotrupes litigiosus, Casey.

With some hesitation by the author, this species is created at the expense of *ligneus*, on the grounds of colour pattern, differences in the size and shape of the elytra and thorax, differences in the punctuation and pubescence of the elytra, and certain differences in the anterior and middle tarsi of the males. All these characters are evanescent when a large number of examples from all parts of the country are placed together. There are before me now about 20 from Massachusetts, New York, Canada, Colorado, New Mexico, and the Pacific coast, and I have examined lately perhaps twice that number. The coloration of the elytra amounts to nothing in this species; one example is unicolorous rufous, except a blotch at the side; another is entirely black except a narrow marginal and subsutural line before the middle, rufous: between these extremes there are all kinds of spottedness and fasciateness. The series in my collection disproves the validity of the next two characters, and need not be discussed. I have only a male of the proposed species, and while the anterior and middle tarsi are in it as described by Mr. Casey, yet some of the males with differently coloured elytra have nearly the same form of tarsi, and there does not seem to be uniformity nor constancy in this character. The name will do very well for a colour variety, and two more might be made in this species with equal propriety.

Psenocerus tristis, Casey.

Since the note on page 160 of this Vol., I have obtained an exactly typical example of *tristis*, in which there is scarcely a suspicion of the basal elytral tubercles, and also one of the *supernotatus* colour in which they are equally inconspicuous. Another black example has them as fully developed as any of the rufous individuals. Their synonymy is seemingly absolute.

Leptura serpentina, Casey *(l. c.)*.

The statement that this is a "valid species" must be reversed; fresh material from California and an inspection of other collections show it to be synonymous with *3-balteata*, Lec., which is somewhat variable in form and elytral ornamentation: the length of the antennæ in this species as well as in many other Cerambycides is variable; in one collection there is an example of *3-balteata* with one of the antennæ blackish and the other rufous, and in another an example with them partly dark and partly

rufous. It is easy to pick out typical *3-balteata* and *serpentina*; but what about the intermediates?

Marolia (Dircaea) Holmbergii, Mann.

Three examples of this pretty little species from Queen Charlotte Island, British Columbia, are before me, which agree absolutely with Mannerheim's description. Dr. Leconte described *Hypulus fulminans* from Oregon in words so similar to Mannerheim's, that his description is entirely applicable to these examples, allowing for a little variation in the colouring of the tibiæ. As Dr. Leconte suggested, his species is probably the same as Mannerheim's, and a comparison of types seems scarcely necessary. (Bul. Mosc., 1852, 347; Proc. Acad. Phil., 1859, 284.) Mannerheim's type was a unique taken at Sitkha.

Cteniopus murrayi, Lec.

Andrimus is proposed by Mr. Casey for this and four other forms described by him as species, namely, *brunneus*, *concolor*, *nigrescens* and *convergens*. Lately came to hand one ♀ and five ♂ examples belonging to this genus, said to have been taken at one place near Jacksonville, Florida, which I would have referred without hesitation to *murrayi*, had it not been for Mr. Casey's paper. Using the characters he employs in the separation of his species, there should be three as valid as any of his, and neither of them *murrayi* nor Mr. Casey's species. One ♂ and its assumed ♀ are near *brunneus*, but not quite; two ♂'s approximate *concolor*, but there are points of difference; while the other two do not quite agree with the description of *murrayi*. Without discussing details, with these insects in hand, and a careful study of Mr. Casey's descriptions, the conclusion reached is that at least three of his species, and the three which it would otherwise be necessary to create, are all one, and that *murrayi*. The Cistelidæ is one of the degredational families in which great latitude must be allowed for individual structural variation, otherwise there will be an excessive and artificial multiplication of species.

Apion.—A species occurs here very abundantly in June on Vaccinium stamineum which seems to be undescribed, apparently belonging in section 4 of Smith's Synopsis; it may be known by its slender beak, shorter in the ♂, antennæ inserted near the base, with the first joint short and strongly clavate, the second one half its length, but not more slender; by the thorax short, scarcely narrowed anteriorly, closely moderately punctured, and with a circular impression at base more or less obvious, the

humeri prominent, base of elytra wider than thorax, striæ deep and punctured, intervals convex, claws acutely appendiculate, a bunch of long yellow bristles between the middle coxæ, black, scarcely or not pubescent; length, .05 inch, It occurs with *Anthonomus corvinus*, and being of the same size and appearance, some care is requisite in their separation.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in its rooms in Victoria Hall, London, on the 31st of August and the 1st of September, the President, Rev. Dr. Bethune, of Port Hope, occupying the chair. The reports of the Treasurer, Librarian and Curator, the Delegate to the Royal Society, the Council, the Botanical, Geological, Microscopical and Ornithological Sections, were read and approved. The President delivered his annual address, and several interesting papers were read. A number of rare and remarkable specimens were exhibited. Full reports, with all the papers and proceedings in detail, will be published in the forthcoming Annual Report to the Legislature.

The following gentlemen were elected officers for the ensuing year :—

President—W. Hague Harrington, Ottawa.

Vice-President—J. M. Denton, London.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors—Division 1—James Fletcher, F. L. S., F. R. S. C., Ottawa.
" 2—Rev. C. J. S. Bethune, F. R. S. C., Port Hope.
" 3—Gamble Geddes, Toronto.
" 4—A. H. Kilmun, Ridgeway.
" 5—J. Dearness, London.

Librarian and Curator—I. Alston Moffat, London.

Editor of the Canadian Entomologist—Rev. C. J. S. Bethune, M.A., D.C.L., Port Hope.

Editing Committee—J. Fletcher, Ottawa; H. H. Lyman, Montreal; Rev. T. W. Fyles, South Quebec; J. H. Bowman, London.

Delegate to the Royal Society—The President.

Auditors—J. H. Bowman and W. E. Saunders, London.

A PRELIMINARY GROUPING OF THE DESCRIBED SPECIES OF SAPROMYZA OF NORTH AMERICA, WITH ONE NEW SPECIES.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

The following is a purely provisional grouping of the described North American species of *Sapromyza*, made up from the descriptions alone. As such, it is offered for publication. The practical use of this kind of work does not need pointing out. It greatly facilitates the identification of species where the descriptions are scattered through various works. In the determination of the single new species described at the end of this paper, it was necessary to consult each description separately. It required but little additional labour to tabulate the leading points in the descriptions, thus relieving later students from the necessity of going through the same laborious process. It is only necessary to give a warning against using the table without consulting the descriptions. The references to the latter will be found in the Osten Sacken Catalogue.

PRELIMINARY TABLE OF N. A. SPECIES SO FAR DESCRIBED.

a Flavous, rust yellow or rufous species.

b Wings, without distinct markings (spots or fasciæ).

c Antennæ and palpi concolorous with rest of body.

d Face and body unspotted.

e Antennæ, palpi, and body flavous, wings lutescent ..... BISPINA Lw. (Nebr.)
TENUISPINA Lw. (Nebr.)
ROTUNDICORNIS Lw. (Sitka.)

ee Antennæ and body pale honey-yellow, terminal antennal joint rounded; wings with a slight yellowish tinge..... ....CONNEXA Say. (Indiana)

eee Antennæ ferruginous, palpi golden ochreous, body yellow, wings yellowish; front honey-yellow ....SORDIDA Wd. (W. Indies)

eeee Antennæ and body fulvous, palpi yellow; wings clear..... .....AMIDA Wlk. (Ga.)

dd Face with a black spot.

f Body unspotted, lutescent, opaque; wings yellowish-cinereous....MACULA Lw. (Texas)

ff Abdomen with six and scutellum with two black spots, otherwise yellow..... .... OCTOPUNCTA Wd. (W. Indies).

cc Antennæ concolorous, palpi black ; antennæ, body and wings honey-yellow.....RESINOSA Wd. (Ga.)

ccc Antennæ and palpi black on apex.

g Ocellar area enveloped in a round black spot.

h Body pale yellow, wings clear; arista short plumose above and below..... ....VULGARIS Fitch (Atl. St.)

hh Body pale rufous, wings clear; arista long plumose above, short plumose below..... .....OCELLARIS n. sp. (New Mex.)

gg Ocellar area concolorous with rest of front; body flavous, wings dilute pallid to fuscous ; posterior segments of abdomen with black hind margins..... .....CINCTA Lw. (Cuba)

bb Wings with markings.

i Body not spotted or vittate.

j Antennæ, palpi, and body flavous ; wings lutescent with spots..... .....FRATERNA Lw. (Pa.)

jj Antennæ, palpi, and body flavescent ; wings lutescent, except markings .....COMPEDITA Lw. (Pa.)

jjj Antennæ and body pale yellow, wings spotted .... NOTATA Fallén (Eu. & N. A.)

jjjj Body pale yellow to rufous, wings spotted..... ....PHILADELPHICA Mcq. (N. A.)

ii Either thorax, scutellum, or abdomen with spots.

k Body pale honey yellow, scutellum with two black dots on hind border..... ....BIPUNCTATA Say (Mexico).

kk Body flavescent, with black spots ; wings fuscous, reticulate.....DECORA Lw. (N. Y.)

iii Thorax and scutellum subfuscous vittate ; body flavescent, except vittæ. ..... UMEROSA Lw. (D. C.)

aa Blackish or gray species, at most with abdomen more or less rufous.

l Wings unmarked.

m Body black, wings yellow.....
....LONGIPENNIS F. (Eu. & N. A.)

mm Body cinereous, opaque; wings lutescent .....
..... QUADRILINEATA Lw. (Pa.)

mmm Thorax slate-colored, abdomen dilute rufous; front white fasciate .....LUPULINA F. (Eu. & N. A.)

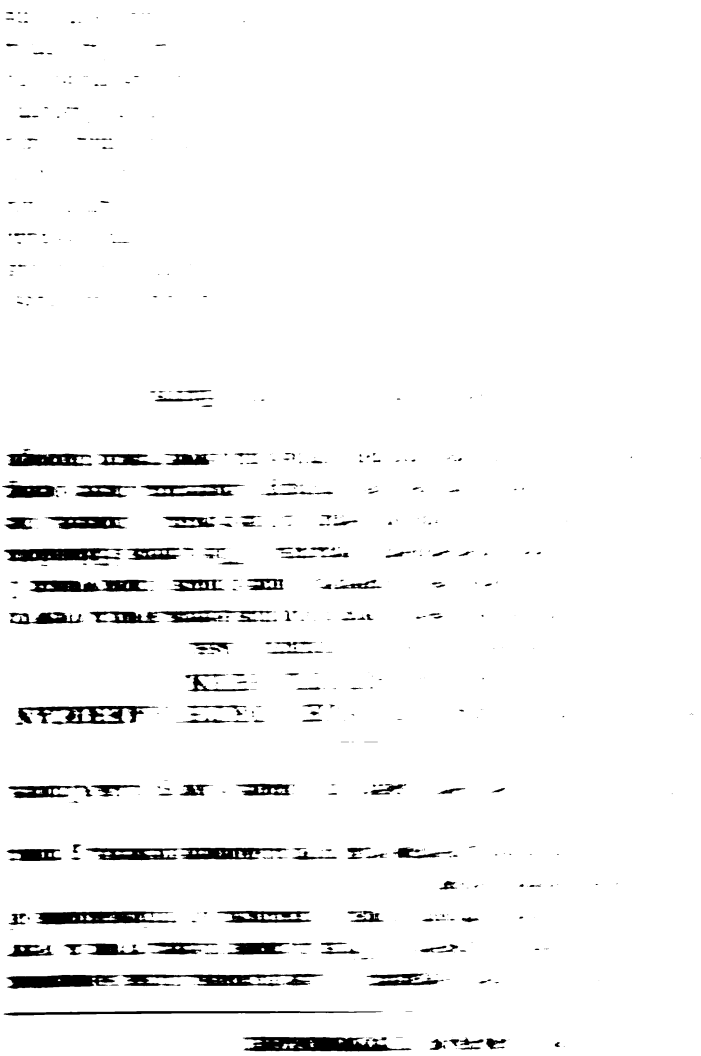
ll Wings spotted.

Body opaque; head, thorax, and scutellum cinereous, with black dots and spots .....
.... STICTICA Lw. (D. C.)

NOTE.—*Sapromyza apta*, Walker, is described from Mexico, in the Trans. Ent. Soc. Lond., new series, Vol. V., p. 321. I did not have access to this paper.

Sapromyza ocellaris, n. sp.

Yellowish rufous. Eyes brown; face, front, cheeks, and occiput entirely light rufous yellow, except the slightly elongate round black spot on vertex enclosing the ocelli; two pairs of ocellar bristles, the posterior pair decussate and very slightly directed backward, the anterior pair a little divergent and very strongly directed forward; four frontal bristles on each side, posterior one on vertical margin near orbit directed backward, second one the longest and directed backward, as is also the next or third one, fourth or anterior bristle (partly broken off, but apparently) directed forward. Antennæ erect (*i. e.*, extended at right angle to plane of face), rufous yellow, the apical portion of third joint black, extending on outer lower edge nearly to base of joint; first joint very small, third elongate, narrowed towards the end, about three times as long as second, second joint with some bristly hairs on lower anterior edge; arista black, plumose on upper side, but only short hairy below. Proboscis yellow, palpi yellowish at base, but broadly black on tips. Thorax rufous yellow, with a few black posteriorly inclined bristles on dorsum, and with very short bristly black hairs; scutellum concolorous with an apical non-decussate pair of bristles, and a lateral bristle near base. Abdomen somewhat oval heart-shaped, strongly vaulted, fully as wide at base as thorax, short, rather sharply narrowed to apex, of a fulvous tinge, the anterior half of segments 2 to 4 of shining rufous-brown changeable to fulvous in oblique lights; dorsum of abdomen with short black bristles, longer bristles on



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This is a very distinct race.† The moths are noticeably different, and can usually be readily picked out. The larvæ, too, differ from both the other races, being intermediate between the two. They are subject to a wonderful amount of variation, as I have elsewhere pointed out,* some examples closely approaching the larva of *maculata*, though the intermediate, typical form is quite different.

The above conclusions have been reached after breeding larvæ at various points on the Pacific Coast, and I have been assisted by information kindly given by Dr. H. H. Behr, of San Francisco, and by Prof. O. B. Johnson, of Seattle.

HALISIDOTA (LOPHOCAMPA) ARGENTATA, Packard.

race *sobrina*, Stretch.

race *subalpina*, French.

Almost strictly parallel to the preceding, *H. argentata* presents three local races. The Eastern one, *subalpina*, French, does not reach to the Atlantic States, nor probably even to the Mississippi Valley. It may be said to inhabit the Rocky Mountain region. Its larva is unknown, but the moth approaches *H. argentata* so closely, that I can find no distinguishing characters. The ground colour seems a little more yellowish, less densely covered with brown, but I doubt the constancy of this obscure character. Prof. French compares his moth with *H. scapularis*, Stretch (= *ingens* Hy Edw.), a very distinct insect, and I can only account for his failure to mention *argentata*, by the supposition that he did not possess specimens of it. If he had, it seems doubtful that this race would have ever received a name.

The race *argentata* proper inhabits the Sierra Nevada of California and the Pacific Northwest. It is abundant where found, its larva feeding on various coniferæ.

In the coast region of California we have, again, the most distinct race, *sobrina*, Stretch. Both moth and larva present perceptible differences. The white spots on the wings are smaller, and the brown ground colour more even and less irrorate, though the difference in coloration of the thoracic and abdominal parts as exhibited in Stretch's figure does not exist. The differences in the larvæ have been pointed out by Hy. Edwards, though he makes more of the slight differences than seems justifiable to me; they are not nearly so striking as his remarks would

* Psyche, VI. 323. † Dr. Behr considers it to be a valid species, and there is much in favour of his view.

lead one to suppose. Moreover, the larvæ of *sobrina* are quite variable, some being darker, others lighter, as they occurred to me in some twenty-five examples at Monterey, Cal. I found but two larvæ of *argentata* at Portland, Or., both being dark in colour, with the yellow hairs reduced as described by Mr. Edwards, so that these characters seem fairly constant.

Halisidota (Halisidota) tesselaris, Abb. and Sm.

Halisidota (Halisidota) harrisii, Walsh.

I maintain the specific distinctness of these forms, though Mr. Neumoegen is unwilling to do so, because the moths cannot be superficially distinguished. They inhabit the same territory, so that we cannot have here to do with local races. I have verified the observations of Walsh, and shown some additional differences in the manner of growth of the larvæ.* The difference in the male genitalia gives additional weight to my conclusion, though I wish to examine more specimens before I can be sure that these differences are constant.

Halisidota (Zatrephes) trigona, Grote.

A specimen of this species, received from Dr. McKnight, shows that I have been mistaken in referring it as a synonym of *specularis* H. S. I am obliged to Mr. Grote for promptly pointing out the error. Mr. Neumoegen has written out, somewhat at length, the differences between the two species.

HALISIDOTA (AEMILIA) ROSEATA, Walker.

cinnamonea, Boisd.

significans, Hy. Edw.

sanguivenosa, Neum.

This pretty little species has proved a pit-fall to more than one describer, as witness the above synonymy. It has been unique in our fauna until the discovery of *H. occidentalis*. French has given us its close ally. The two differ only in coloration. *H. roseata* has a wide range, from Sonora (Boisduval) and New Mexico (Hy. Edwards) on the south, through California and the North-western States to British Columbia. Its larva is unknown, but it will probably prove to be a pine feeder.

Halisidota (?) macularia, Walk.†

This name awaits identification. It is referred to by Stretch,† but I cannot find it in Kirby's catalogue anywhere among the Phægopterinæ. The description reads like an Ecpantheria.

* Psyche, VI. 162.

† Cat. Brit. Mus. XXXI. p. 314 (1864). † Ent. Amer. I. 107.

PARTIAL PREPARATORY STAGES OF CATOCALA ILLECTA, WALKER, WITH NOTES.

BY G. H. FRENCH, CARBONDALE, ILL.

Three days before the last moult, the larva is 1.30 inches; after the last moult and three days before pupating, 2 inches. Nearly cylindrical, tapering from the middle to both ends, the under side a little flattened, a slight fold above the legs but no fringe on the sides. The markings in the two last stages are the same, except that the orange is a little heavier in the last stage. The ground colour of dorsum, sides, except below stigmata, and venter sordid white, below stigmata clear white; striped transversely over the back as low as the stigmata, thus leaving a clear white substigmatal stripe, eight of these stripes and these somewhat double, some broken and others partly continuous; a subdorsal and substigmatal row of orange patches, two of each row on each joint, the lower on each side of the stigma on the anterior part of the body, but on the posterior part these patches connect above the stigma, gradually passing from one form to the other; on joint two, instead of two patches, the anterior half of the joint is orange with a row of black spots; joints three and four with an irregular row of orange across near the middle of the joint. The fold above the legs black, with an orange spot on each joint; the true legs orange with black tips, each with an obscure white stripe at the base; the prolegs black and orange, with a white stripe at the base, anal legs orange; anal plate orange with an anterior row of black spots; the joint preceding this contains a somewhat zigzag transverse irregular orange stripe with black mottlings. Head olive, with four black longitudinal stripes to a side and one in the middle. Venter dull sordid white, rather dark; the anterior joints, two to four, unspotted but striped transversely between the joints with black, the black and white lines going round the base of the legs; joints five and six striped as above, even with the orange patches, but these paler than above; joints seven to ten black between the legs and striped transversely between the joints with black and white; joints eleven and twelve irregularly marked with black, as though the transverse black lines were broken into dots and dashes, an orange patch containing a black spot on each side of each joint, the orange connected with the orange on the lateral fold; joint thirteen dull blackish; each of the last three joints with blackish centres.

The chrysalis is 1 inch long, subcylindrical, slightly indented on the dorsum of the first abdominal joints, tongue and wing cases extending

back to near the posterior part of joint five, tapering from five to the end, cremaster with two long hooks, two more about half as long from the tip, and several as long as the longer ones arising further back on the last joint. Anterior part rounded, abdominal joints punctured, other parts wrinkled. Brown, covered with a white powder, as in common with other species.

In pupating, leaves were fastened together with silk, the interior lined with a thin lining of silk to which the hooks of the cremaster were fastened. The food plant is honey locust. I have several times found the larvæ on low bushes of this tree.

In many respects this species is peculiar. In habits, it is one of the earliest, hatching the fore part of June in this latitude, after a pupal period of three weeks. I never found but one imago in the day-time and that was scared up from some raspberry bushes. I am of the opinion that it does not stay on trees in the day-time, as do most species, but hides among low bushes. I have not found the larva by whipping the limbs of trees, but on low bushes, and usually in such cases down in the grass, but on the stem of the food plant.

It is the only species I know that is striped transversely in the larval state; in fact, there is nothing in the markings of the larva that would lead one to suspect that it belonged to this genus. It is one of three species of which we have descriptions that has no lateral fringe. *Obscura* and *Innubens* being the other two. There are a few brief descriptions that are so imperfect that we cannot tell whether the larvæ were fringed along the sides or not.

The species in this country whose larvæ have lateral fringes are *Desperata*, *Retecta*, *Relicta*, *Amatrix*, *Cara*, *Concumbens*, *Unijuga*, *Stretchii*, *Parta*, *Ultronia*, *Ilia*, *Palæogama*, *Polygama*, *Cratægi* and *Minuta*. To this we may add the European species *Fraxini* and *Nupta*. This makes fifteen of our American species that are known to have fringe along the sides of the larvæ, and three that are known not to have. One feature about it is that according to our systems of classification the unfringed are mixed with the fringed. While this shows us that we do not know all about the affinities of the genus yet, still we know too little of the early stages to enable us to use it for classification. Some one has said we should place *Illecta* near *Concumbens* on account of similarity of markings, notwithstanding the dissimilarity of colour of hind wings. The above shows that the larvæ are as dissimilar as those of any species now known. At present it is well enough to let the lists be as they are.

DISCOVERY OF THE GENUS CRATÆPUS FÖRSTER IN AMERICA, AND THE DESCRIPTION OF A NEW SPECIES.

BY WM. H. ASHMEAD, WASHINGTON, D. C.

In 1878 Dr. Arnold Forster, in his "Kleine Monographie", erected many new genera in the family Chalcididæ that have been either overlooked by subsequent entomologists, or, at least, not included in any recent tables of the genera of this family, amongst which is a genus he calls *Cratæpus*, placed by him in the *Tetrastichoidæ*, and which I am pleased to announce also occurs in America.

The genus has only recently been recognized by me in a re-study of a minute chalcid sent to me some years ago by my Canadian friends, Messrs. James Fletcher and W. Hague Harrington, of Ottawa, who reared it from a Dipterous larva destroying the seeds of the "Canada Thistle" (*Cirsium arvense*, Scop.), and to which I gave the MS. name *Solenotus Fletcherii*, although at the time I felt satisfied it was improperly placed in this Thomsonian genus, as I wrote: "This species exhibits strong Tetrastichid affinities, and the genus, if properly recognized, may ultimately be assigned a position in that sub family."

It is a singular fact, and another illustration of the uniformity of habits of the species of a genus, that *Cratæpus aquisgranensis*, Förster, the type of the genus, and the only other species known, was reared by Förster from *Cirsium lanceolotum*.

The description of the Canadian species is as follows:—

Cratæpus Fletcherii, sp. n.

♀.—Length, 2 mm.; ovipositor half the length of the abdomen. Black, shining; sutures of trochanters, apex of femora, front tibiæ, except extreme tips, apex of middle tibiæ, hind tibiæ, except a blotch at the middle, and the basal joint of all tarsi, dark honey-yellow; rest of legs black. The front femora are lengthened and abnormally thickened, markedly contrasting with the slender and shorter middle femora, while the front tibiæ are remarkably short, and slightly dilated. The very short, black antennæ are inserted low down on the face, apparently only 7-jointed, but in reality 8-jointed, the terminal joint being very minute. Head transverse, a little wider than the collar, the face short; collar large transverse quadrate dorsally, obliquely declining towards the head; mesonotum somewhat broader than the collar, flat above, with two distinct furrows and a depression on its disk; scutellum broader than long with

two grooved lines. Wings as in *Tetrastichus*, the nervures, except the submarginal, dark fuscous. Abdomen sessile, depressed above, boat-shaped beneath and terminating in a strong ovipositor that is fully half the length of the abdomen.

Hab.—Ottawa, Canada.

Bred by Fletcher and Harrington from Dipterous larvæ, destroying the seeds of *Cirsium arvense*, Scop.

CNICUS DISCOLOR AS AN INSECT TRAP.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

It is a well known fact that certain plants, as *Silene antirrhina*, L., and allied species, exude a sticky, viscid substance on stalk or peduncle for the purpose of preventing ants, small beetles, and other honey-loving intruders, which are too small to aid effectively in fertilization, from creeping up to the flower and robbing the honey-glands of their precious nectar. Other plants, as the Sundews, *Drosera rotundifolia*, L. etc., excrete a similar substance with which they attract insects, which are caught and afterwards utilized as food by the plant.

But no one, as far as the writer can ascertain, has called attention to the fact that one of our common thistles, *Cnicus discolor*, Gray, has along the middle of the outer surface of each of its involucral scales a large gland whose viscid secretion is poured forth in abundance and is especially attractive to certain species of insects. It is true that Dr. Gray in his Synoptical Flora, p. 402, mentions these glands and uses their presence or absence as characters to aid in the determination of species, but he says nothing of the substance which they secrete.

On various occasions in the autumn of 1891, numerous insects were observed by the writer crowded about the lower involucral scales of the thistle mentioned, where they were evidently attracted by the excretion there found. A closer examination always revealed that a number of the smaller ones were prisoners, their feet having become entangled in the viscid excretion, which had held them firmly, much as the pollen grains of *Asclepias* hold at times our common honey bee.

On Sept. 14 many flies and a number of specimens of a small green beetle, *Diabrotica longicornis*, Say, which feeds upon the pollen of the thistle flowers, were found thus entangled and were dead, as were also three specimens of *Phalangidæ*. A number of them were so dry as to crumble into powder when touched, showing that they had been prisoners

for some time. On the same date as many as eight specimens of a much larger Scarabeid beetle, *Euphoria melancholica*, Gory, were found clustered at the base of a single head. Only one of them was in any way entangled, but all seemed in a dazed condition, as if intoxicated by the substance fed upon. A number of the same beetles were taken from a similar position on several occasions thereafter.

On Sept. 23rd about thirty small, black snout beetles (the genus unknown to me), three specimens of a small butterfly, *Pamphila huron*, Edw., more Phalangidæ, several ants, about twenty large *Hemiptera*, *Euschistus variolarius*, Beauv., together with a number of flies, were taken. Several of the snout beetles, the *Phalangidæ*, ants, flies, and one of the butterflies, were dead. All the others were easily captured with the fingers, being in the same dazed condition as the beetles above mentioned. The thistle heads whose bracts were most frequented by the insects were those in which the flowers had disappeared and the fruit was beginning to mature. Specimens of all the above-named insects were secured at intervals throughout October and until the plants were wholly deadened by the frost.

Of the use of the glands and their excretion to the plant I can give no explanation. They do not seem to serve, as do those of *Silene*, in keeping injurious insects from the flowers, nor does the plant appear to make any use of the insects which become prisoners.

NOTES ON THE HABITS OF *SIPHONOPHORA CUCURBITÆ*, MIDDLETON.

BY F. M. WEBSTER, WOOSTER, OHIO.

During the last days of August, Dr. Kellicott and myself, in studying the Squash borer, *Melittia ceto*, transplanted to a large breeding cage a number of roots and portions of the stems of Squash vines, on one of which was a leaf or two. The cage was filled with earth, dug up in the field, and when the vines were properly transplanted, the cage was covered with fine Swiss muslin, and placed in the Insectary. I soon noticed Siphonophora on the stumps of the vines, and before long there sprung up, from the soil in the cage, numbers of plants of *Capsella bursa-pastoris* and *Nepeta glechoma*. These plants soon became populated, the Squash having died out, and, November 4, I took from these, apterous oviparous females pairing with winged males, and, also, apterous

and winged viviparous females. None of these, however, could be specifically determined by Dr. Riley and his assistants. November 23 there were still many of the egg-laying females and males to be found, and a great number of eggs scattered about over the plants. The oviparous female is very robust, body green; eyes brown and coarsely granulated; antennæ, except first two joints (the bases only of which are black), tip of beak, feet, tips of honey tubes, black; tips of femora and tibiæ, dusky; honey tubes reaching half the length of tail, slender.

The males were light-bodied, with the wing much longer proportionally than in the winged females; black, with margins of abdomen greenish; wing veins dusky; bases of wings very light yellowish; antennæ very dark brown at base, the remaining portion nearly black; eyes brown; anterior femora very light at base and darker toward extremity; middle and posterior femora with less light colour at bases; tibiæ very dark brown, nearly black; tarsi black; honey tubes long, slender, piceous, darker at base.

The eggs were at first of a glassy green colour, but turned to black after being deposited a short time; a little more than twice as long as broad, and appeared to be slightly stuck to the leaves of the plants.

During the following March these eggs gradually disappeared, and the plants again became populated with *Siphonophora*, but specimens sent to Washington were not determinable, except as to genera, and all were wingless viviparous females.

Strongly suspecting that I was dealing with the same species as had been brought into the cage on the Squash, there having been no way by which this could have escaped or another species entered, early in April I planted a number of Squash seeds in the cage. As soon as the young plants appeared they were at once attacked by apterous viviparous females, and on April 18th I secured winged females. On forwarding these to Washington, my own determination of the species as *S. cucurbitæ* was promptly verified. In this case, the environment was, of course, unnatural, and the insects were obliged to use these two species of plants in passing through their cycle, and hence they might find more congenial host plants in the fields; but it seems to me that it would be safe to assume that the melon-louse can readily pass from its summer food plant to either one or both of these, and from them give origin to winged viviparous females in the spring, to return to the original host plant.

BUTTERFLIES ON GRANDFATHER MOUNTAIN, NORTH CAROLINA.

BY THEODORE L. MEAD, OVIEDO, FLORIDA.

Grandfather Mountain is one of a group of mountains rising to a height of over 6000 feet, in Western North Carolina and Eastern Tennessee, and forming the topmost crest of the Alleghanies. The rocks are chiefly granitic, and the crags and peaks naturally of a grayish cast, but rendered more sombre by innumerable blackish foliaceous lichens (Umbilicaria sps). At the bases of the summit crags the forest begins; black spruces and balsam firs, alternating with open meadow-like fields of the sand myrtle (Leiophyllum buxifolium), characterize the upper levels, and enormous hemlocks from 5000 feet down; but everywhere is a wealth of magnificent deciduous trees that can hardly be matched elsewhere on this continent. Flowers are abundant all summer long, and the native grasses are supplemented by cleared fields upon the mountain sides and in the valleys, where grass is grown for hay and pasturage. The whole region one would suppose to be a paradise for mountain butterflies, and especially Satyridæ, which are well represented in the foothills and lower valleys of the Alleghanies.

To my surprise, I did not see a single Satyrid of any species during my stay, July to September, either at Linville (3,800 feet) or at any higher point.

The butterflies were in general of northern type, and with rare exceptions were far more characteristic of Ontario than of the Carolinas. A single *Argynnis Diana* was the only suggestion of the rich butterfly fauna of West Virginia to the north of us, while the only Grapta was *Faunus*, abundant all along the roadsides from 4000 to 5000 feet elevation. Although this colony of *Faunus* must have been isolated from the great body of the species for thousands of years—perhaps since the receding ice of the glacial epoch, the butterflies in no way differ from those found in the Catskills and elsewhere.

The other common butterflies of this region are Papilio Troilus, Philenor and Turnus, with occasionally a black female Glaucus; Colias Philodice flying with about one fifth of its number of Keewaydin and Eurytheme, which are very variable and show all manner of intergrades; Terias Lisa, Danais Archippus, Argynnis Aphrodite, the females of which with worn males, abound on flowers of fireweed *(Erechthites)*, and a *Liatris*, in mountain meadows at 5000 feet and over in August, appearing

in numbers about two weeks later at 4000 feet. A. Cybele, however, is rare, and I saw only a single specimen, which was smaller than the associated Aphrodites, although Cybele is represented by really huge examples in the warmer valleys of Virginia. The single specimen of A. Diana was seen at 3800 feet, at which level E. Claudia is not uncommon. P. Tharos is found occasionally; Pyrameis Atalanta and Huntera were seen on the topmost crags, as well as lower levels. Limenitis Ursula frequented the roads; Thecla Humuli, Chrysophanus Americana, Lycæna Comyntas, with an occasional L. Pseudargiolus, represented the Lycænidæ; and a few Hesperidæ were seen, but not collected.

The list is noteworthy, chiefly for the absence of nearly all the butterflies characteristic of the latitude, and of many others which one would expect to meet in so favourable a mountain region. It is possible that some of these missing species may be found in the early spring, when the mountains are said to be one blaze of colour with Azaleas and Rhododendrons and all manner of vernal blossoms. These butterflies may lay their eggs early—so that the larvæ may have the whole season to grow—and then disappear; but this is mere conjecture, based on the well-attested abundance of early flowers of gay colours well suited for butterfly fertilization.

A NEW GENUS OF DIPTERA ALLIED TO RHAPHIOMIDAS.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

In the "West American Scientist" for January, 1891, I gave a brief description of *Rhaphiomidas acton* n. sp., comparing it with the only other described species, *R. episcopus* O. S. The description was drawn from a single male specimen now in the National Museum at Washington, but during the past season I was fortunate enough to capture four additional specimens of this species, three males and a female, all of them having been taken on the wing while hovering over flowers in the hottest part of the day, the time being the first week in July. The possession of these specimens permits me to make a few corrections to my published description. In profile, the lower edge of the third antennal joint is not conspicuously less convex than the upper edge, and the tip is provided with a minute tubercle (this may have been broken off in the type specimen); the three ocelli are shining, but sometimes lose their lustre in drying; the relative length of the fifth, sixth and seventh ab-

dominal segments, as compared with the third, varies greatly according to the amount of contracting in drying; when fully extended they together are much longer than the third; finally, the eyes in death are almost black. The proboscis varies in length from three to four and a-third times the length of the head. The sexes are essentially alike, both in colouring and in structure, with the exception, of course, of the sexual organs. The species will be readily recognized by the deep orange-yellow ground colour of the abdomen.

In both of the above species the palpi are cylindrical and reach half-way to the anterior oral margin, and the anal cell is closed and short petiolate.

My collection contains a single female specimen which in structure is identical with the above two species, except that the anal cell is wide open. A character so important as this necessitates the erection of a new genus, for which I propose the name of *Apomidas*, n. gen. As it is identical with *Rhaphiomidas*, except in having the anal cell wide open, no further characterizing of it will be required, and the species is as follows :—

Apomidas trochilus, n. sp., ♀.

Head, including the antennæ and palpi, reddish-yellow, occiput and proboscis black, the latter being three times as long as the head; pile of head white. Dorsum of thorax black, the four corners, hind margin and pleura, including the cone, reddish, the breast largely black; pile and bristles of thorax white. Scutellum reddish, the pile and bristles white. Abdomen and venter reddish and yellow, the pile white, that on the last three segments black and directed forward; circlet of twenty-four spines of last segment black. Legs reddish-yellow, the spines yellow, a few on the hind legs black. Wings hyaline, showing a faint milky tinge in certain lights, veins yellowish. Length, 33 m m. Merced Co., Cal. A single female, in midsummer.

CORRESPONDENCE.

MEETING OF THE ENTOMOLOGICAL CLUB.

Sir,—The Secretary's report of my remarks in the discussions held at the meetings of the Entomological Club at Rochester, as published in the October issue, is certainly better than such reports usually are when not revised by the author. The language, however, is hardly my own, and in some cases the expression is misleading. I would therefore beg space for the following emendations :—

Page 249, first paragraph, eleventh line, read: "Acceleration might ordinarily be expected, but this seems not to be the case with this species." At the end of this paragraph insert: "He fully expected, however, that further experience would show a tendency to a second brood at New Brunswick through exceptional individuals, just as there was a tendency to a third brood at Washington."

Page 249, fourth paragraph, read: "In reply to a question by Mr. Lintner, Mr. Riley stated that at Washington the greater part of the second brood of beetles doubtless hibernated, although some laid eggs for a third or even a fourth generation."

Page 250, fourth paragraph, for "species" read "race".

Page 261, next to last paragraph, my remarks refer to Xenos and not to Polistes, which is mentioned immediately above.

Page 262, first whole paragraph, read: "Mr. Riley stated that he knew of no other species of Thyridopteryx similar to *ephemeraeformis*, although this species differed much as to the character of the cases, especially those upon conifers when compared with deciduous trees."

C. V. RILEY, Washington, D. C.

BARK-BEETLE DESTROYER.

Sir,—The Bark-beetle *Dendroctonus frontalis*, Linn., has of late years been committing great ravages among the conifers of the West Virginian forests. In order to offer some resistance to this creature, Mr. Andrew D. Hopkins, Entomologist of the Agricultural Experimental Station at Morgantown, W. Va., has hit upon the expedient of placing in its company an enemy in the European Bark-beetle Destroyer, *Clerus formicarius*, L. For this purpose, Mr. Hopkins recently visited Germany, and here, through considerable skill and good fortune, he secured valuable information concerning the conditions favourable to the existence of this useful insect. He has transported the larva of the Bark-beetle Destroyer at various stages of development, as well as the pupa and imago, to America, all in great quantities, and in a state of hibernation. There being reasonable hopes of by far the greater part arriving over there in a healthy condition, it will be possible next spring to begin the experiments of acclimatization.

CAMILLO F. SCHAUFUSS,

Director of the Museum Ludwig Salvator, Meissen, Germany.

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DESCRIPTIONS OF FOUR NEW WEST AFRICAN BUTTERFLIES.

BY W. J. HOLLAND, PH. D., PITTSBURGH, PA.

EURYPHENE, BOISD.

1. *E. castanea*, sp. nov.

♂. The form of the wings is exactly like that of *Senegalensis*, H.-S. UPPERSIDE.—The ground colour is rich chestnut-brown, marked by broad black series of spots and bands. Upon the primaries these markings are as follows :—In the cell a longitudinal basal streak, a transverse line, a figure 8, a twice curved transverse line, and a broad bar at the end of the cell constricted in the middle ; below the cell there is a short basal band curving inwardly ; beyond the cell there is a wide band running from the costa toward the outer margin as far as the lower radial, and then abruptly turning and extending to the middle of the inner margin ; beyond this is a broad band of diffuse spots, wide on the costa, narrower beyond the end of the cell, and gradually widening as it approaches the inner margin ; beyond this is a submarginal series of very black round spots. The outer margin is black. All of these lines are continued upon the secondaries parallel to the outer margin, and in addition there is a narrow, submarginal black line. In the cell of the secondaries there is a round spot at the base, a figure 8, and a constricted annular mark at the end. UNDERSIDE.—The prevalent colour on the underside of the wings is pale fuscous, shading into ashen grey upon the cells of both wings. The markings of the upper surface scarcely reappear upon the lower side, except the submarginal band of round spots, which reappear upon the primaries as faint blackish marks, and upon the secondaries as ocelli with pale ashen margins. In both wings there are in the cell a black basal dot, a figure 8, and a narrow constricted annular mark at the end. In addition, upon the primaries the costa near the base is white, and there are a couple of small white marks at the apex ; upon the secondaries there is a narrow white bar extending from near the middle of the costa to the first subcostal nervule.

Expanse 58 mm. Habitat Kangwé, Ogové Valley.

2. *E. suffumigata*, sp. nov.

♀. The form of the wings is like that of *E. eliensis*, Hew. UPPERSIDE.—Both wings are dark smoky-brown, shading into black at the apex of the primaries and clouded on the costa and cell of the primaries, with obscure black markings. There is a broad yellowish subapical band on the primaries, running from the costa and terminating before the outer margin above the third median nervule. Upon the secondaries there is a continuous slightly undulating dark brown submarginal line. UNDERSIDE.—The ground colour is light green, or glaucous. The costa of the primaries at the base, the apex, the costal portion of the subapical band of the primaries which reappears upon the lower side, and a narrow bar running from before the middle of the secondaries from the costal to the first subcostal, are all white. The outer half of the wings is suffused with a fuliginous shade defined inwardly by a curved line running from the outer margin of the primaries below the apex to the origin of the third median, and thence to the middle of the inner margin, across the secondaries beyond the end of the cell, sweeping inwardly from the origin of the third median to a point above the anal angle on the inner margin. Faint traces of a submarginal band of ocelli appear upon the secondaries. Body and legs concolorous.

Expanse 75 mm. Habitat Talaguga, Ogové Valley.

This noble and well-marked species is represented in my collection by a single specimen taken in the spring of the present year. It is likely to be confounded with *E. Phantasia*, Hew., from which it may, however, be at once distinguished by the absence of the broad blue submarginal band running from above the first median nervule on the primaries to the anal angle of the secondaries in the female.

ATERICA, BOISD.

3. *A. fuliginosa*, sp. nov.

♀. Antennæ black. Body above dark brown. Underside of palpi, thorax and abdomen light grey. UPPERSIDE.—The ground colour of the upper side of the wings is smoky-brown, shading into dark brown near the apex of the primaries. There is a series of four minute white spots extending from the costa before the apex to the third median nervule. A broad oblique subapical yellow band runs from the first subcostal nervule beyond the cell toward the outer margin, terminating upon the first median nervule. The inner margin of this band is moderately straight; the outer margin is irregular, being indented upon the lower radial and the second

median nervules. The usual markings appear obscurely in the cell. The posterior wings are ornamented by a submarginal band of obscure ocelli running parallel to the outer margin. These spots are lighter than the rest of the wing and ringed about with dark brown, and have in the centre dark brown subhastate pupils. UNDERSIDE.—The underside is obscurely brownish-grey. The markings of the upperside reappear, and on the underside of the secondaries the submarginal band of ocelli is indicated by a series of minute white spots located on the inner edge of each ocellus. There are seven of these minute white spots on each secondary. The base of the secondaries has a few obscure markings characteristic of the genus, the most prominent of which is an annular mark in the middle of the cell.

Expanse of wings 68 mm. Habitat Kangwé, Ogové Valley.

I hesitated to describe this species from the solitary ♀ specimen, but it is wholly unlike the female of any species known to me, and does not exist in any of the English collections which I have consulted, and was pronounced by Mons. Mabille, to whom I showed it, as undoubtedly a new species. It comes nearest to *A. aridatha*, of Hewitson, but it is totally distinct, being much larger and quite differently coloured, and the subapical band of the primaries having an altogether different form.

EUPHAEDRA, HUBN.

4. E. imitans, sp. nov.

♂. Very closely allied to *E. Eusemoides* recently described by Smith & Kirby, but readily distinguished from that species by the fact that the yellow spots on the middle of the primaries are not widely separated as in Eusemoides, and that the base of the primaries is adorned by a number of *blue spots*, and that along the inner margin of the primaries there is a *long yellow streak*. The secondaries have a *yellow spot on the base and three black spots in the cell*, and the broad black border is interrupted by a *marginal series of obscure geminate blue spots*. The underside has a spot at the base of the secondaries pupilled with yellow, in addition to the spots which appear upon the underside of *E. Eusemoides*.

♀. The female is like the male, but much larger, and the marginal blue spots upon the upperside of the secondaries are brighter and larger.

Expanse ♂, 58 mm.; ♀, 85 mm. Habitat Talaguga, Upper Valley of Ogové.

Represented in the collection of the author by two males and one female. It is a very close mimic of *Xanthospilopteryx longipennis*, and even more so of a species of this genus in the collection of the writer which has not yet been named.

Pittsburgh, Nov. 30, 1892.

SOME NEW ADDITIONS TO THE GENUS CLISIOCAMPA, CURT.

BY B. NEUMOEGEN, NEW YORK.

C. Mus, nov. spec.

♂. Head, palpi and thorax whitish gray. Antennae brown, with whitish stems. Abdomen gray, intermixed with black hair. Primaries dark gray, with veins indicated more or less by white. A broad blackish transverse band between two whitish lines, which are slightly toothed at intersections of veins. Basal space whitish, with black tings along costa. Fringes gray, with brown accentuations at terminus of subcostal and median veins. Secondaries dark chestnut-brown, fading into whitish tinges along anal margin and in basal space. A faint, whitish mesian line. Fringes gray and brown alternating.

Below. Primaries dark brown, dusted with gray in submarginal space and along costa. The outer transverse line well marked. Secondaries whitish gray. The mesian line well curved and prominent. Legs brownish-gray. In some specimens there is a shading from gray into light brown, and the white veins are less prominent on upper surface of primaries.

♀. Antennae, head and thorax whitish gray. In some specimens exceptionally blackish-brown. Abdomen whitish gray. Primaries dark gray. A broad, blackish transverse band enclosed in white transverse lines, slightly toothed at veins. The latter appear as white horizontal lines, in crossing this band. Basal space whitish. Fringes as in ♂. Secondaries of chestnut colour, fading in basal space, with black dashes, especially along costa. Fringes alternately brown and gray.

Below. Primaries and secondaries light chestnut-brown, slightly dusted with gray granules. Basal spaces of whitish tinge. The outer transverse line of primaries indicated in dark brown. Legs and abdomen yellowish-gray, dusted with black.

Types, ♂ ♂ and ♀ ♀. Coll. B. Neumoegen.

Expanse of wings: ♂ 24-25. mm.; ♀ 36-37. mm.

Length of body: ♂ 8. mm.; ♀ 10. mm.

Habitat: Southwest Utah (about 30 specimens) and Arizona, (Prescott, one specimen.) Easily recognizable by its gray primaries with dark band, traversed by white veins.

C. Mus. var. *discolorata.*

♂. Antennae, head and collar dark brown. Thorax and abdomen brownish-gray. Wings light brown. The two transverse lines of primaries dark brown, with an outer tinge of yellowish.

Below. Primaries light brown. The outer transverse line well marked

in darker brown. Secondaries of a somewhat lighter tinge, with yellowish dust. Brown mesian line. Legs and abdomen dark brown.

Type, 1 ♂ from S. W. Utah. Coll. B. Neumoegen.

Raised out of a lot of about 50 typical *C. Mus* by Mr. Chr. I. Weidt. It seems to be rare.

♀. Antennae dark brown. Thorax and abdomen brownish-gray. Wings chestnut, with somewhat lighter dusting along anterior margin, and in basal space. Well marked dark brown lines encircling transverse band of primaries. Secondaries with lighter basal shades.

Below. Wings light chestnut, with grayish granules along anterior margins and basal spaces. Outer transverse line of primaries, and mesian line of secondaries slightly indicated.

Types coll. B. Neumoegen.

Several specimens raised by Mr. Weidt in S. W. Utah, and one specimen from Prescott, Arizona, tallying with the foregoing, but being of somewhat lighter colour in its wings.

C. Azteca, nov. sp.

♂. Antennae brown. Head and thorax grayish-brown. Wings and body of a peculiar blackish-brown tint. Primaries: apex sharply pointed. A transverse band of still darker shade, the two border lines of the same especially dark, the outer line relieved by a yellow streak. Running parallel with the latter, from costa to inner margin, a subterminal undulating irregularly shaped band, giving the wing the appearance of having three transverse lines. The inner line, encircling basal space, well curved towards base; the anterior line somewhat outwardly curved in its course through median space. Secondaries uniform in colour. Fringes of both wings alternating with yellow.

Below. Legs and body grayish-brown. Wings of a lighter brown shade, powdered with yellowish grains along anterior margin of primaries and over the entire surface of secondaries. Primaries show the outer transverse line, and secondaries a well curved mesian line. Basal spaces the darkest in both wings.

♀. Blackish-brown, lighter in shade than ♂. Body concolorous. Antennae, head and thorax grayish-brown. Primaries with broad transverse band, the inner line well curved towards base and of grayish colour. The outer line grayish, somewhat bulging at centre and slightly dentated at veins. Secondaries uniform in colour, showing a faint trace of a mesian line. Fringes in both wings alternating with faint yellow.

Below. Wings uniform in colour, but of lighter tint than primaries, which show faintly the outer line of transverse band. Secondaries with a somewhat darker undulating mesian line.

Types: 2 ♂ ♂ and 2 ♀ ♀. Coll. B. Neumoegen.

Expanse of wings: ♂ 31. mm.; ♀ 36. mm.

Length of body: ♂ 6. mm.; ♀ 10. mm.

Habitat: City of Mexico and vicinity. Caught by Mr. Moonz.

This is the darkest coloured American Clisiocampa and easily recognizable.

DESCRIPTION OF A NEW TOLYPE.

BY B. NEUMOEGEN, NEW YORK.

P. tolteca, nov. sp.

♂. Antennae light brown. Eyes black. Head, prothorax and thorax snowy white. Tegulae snowy white, with black hairy centre band, connecting it with the black haired abdomen, just like in *T. velleda*, Stoll. Abdomen metallic black, clothed with long hair and long drawn out anal tuft. The latter intermixed with white hair. Primaries dark slate, especially in the interspace formed by a marginal and a double central transverse line, as well as along costa and internal margin. Veins white. A lunulate white discal spot, and whitish tinges around it. Three transverse, undulating, white lines, two of which are double, the discal space being enclosed by these double lines, and the marginal transverse line being single. The latter crosses from apex the subcostal veins in a straight line parallel with anterior margin, but becomes undulating in traversing the median veins. A thin, dark line indicates anterior margin. Fringes light brown. Wings show irridescence in a slanting position. Secondaries dark slate, with gray fringes; anterior margin indicated by a thin black line.

Below. Palpi black below. Abdomen and legs snowy white, the latter pilose, having the tibiae dotted with black. Wings blackish slate, especially dark along costal and in basal spaces, with veins and undulating marginal lines of grayish white.

♀. Much larger and of lighter shade than ♂. Antennae, head, thorax and central thoracical streak the same as in ♂, but the hairy body snowy white, with gray segmentary tuft. The same transverse lines on primaries, the one near base and the central line, which enclose disc, being double, and only the marginal line being single. Basal area tufted with snowy white. Costa whitish. Fringes light brown. Veins white. Secondaries dark slate, with basal white tuft, a white undulating marginal line and grayish-brown fringes.

Below. Black palpi. White abdomen and legs, the tibiae with black dots. Anal portion of body covered with light brown hair. Wings slate colour with white nerves. Primaries showing the white double central and marginal, the secondaries only the marginal line. Basal areas and sections along marginal lines the darkest.

Types, 2 ♂ ♂, 2 ♀ ♀. Coll. B. Neumoegen.

Expanse of wings: ♂ 30. mm.; ♀ 45. mm.

Length of body: ♂ 10. mm.; ♀ 21. mm.

Habitat: City of Mexico and vicinity. Collected by Mr. Moonz.

This insect greatly resembles *T. velleda*, Stoll., but its transverse lines on primaries differ and it is easily distinguished by its smaller size and darker colour, especially on the secondaries.

CAN THE DIPTERA BE CONSIDERED THE HIGHEST INSECTS?

BY C. H. TYLER TOWNSEND.

In the Nov., 1892, number of the CANADIAN ENTOMOLOGIST, pp. 269-70, there is printed a paper which was read by Professor H. Osborn before the Entomological Club of the A. A. A. S. at its Rochester meeting in August, 1892. It is entitled: "Honey-bee or House-fly." In this article Professor Osborn questions the view, first advanced by Hyatt and Arms, that the Diptera are to be considered the highest insects. At the end of the paper appear the following remarks, which were made at the time the paper was read before the meeting:—

"Mr. Smith thought that the line of argument adopted by Messrs. Aldrich and Townsend was inconclusive, and that the article referred to carried with it its own refutation. He thought Mr. Osborn was correct in that the orders should be placed parallel, but that groups or families were more highly developed in some orders than in others. Mere specialization is never a test of rank in itself, and any line of argument that places the Hippoboscidæ at the head of the insects as the highest in rank is simply unworthy of attention, since it omits the intellectual or nervous development as a factor."

The over-confident and assuring manner in which the above paragraph disposes of the subject is rather ludicrous. One might fancy the question finally answered, and consigned to oblivion. I feel safe in saying that such a hasty and incompetent dismissal of the subject will command little attention from anyone who is well informed in insect embryology.

Professor Osborn's paper simply makes the point that there are objections to attempting an expression of lineal rank or descent in groups of animals, but that the orders of insects are divergent, or more or less parallel developments from a common form.

The writer, in his note on the subject in *Science* (June, 1892), did not attempt to express the idea that the orders of insects led up in a natural or any other series to the Diptera; nor is any such view held by Hyatt and Arms, or Professor Aldrich, in what they have written on the subject. I desire to say also that I have not in any way upheld the view that the Hippoboscidæ should be considered the culminating point, but have rather pointed to the cyclorrhaphous families as occupying that position.

It is very conclusively shown by Hyatt and Arms, Insecta, pp. 273-4,

287-8, that the Diptera are by far the most specialized insects, and that they should therefore be considered the highest in rank. If any one still doubts that they are the most specialized, he may be referred to the late edition of Lowne's Anatomy etc., of the Blow Fly, part I., Oct., 1890. The wonderful development of the muscid pupa from the imaginal discs, all the larval organs undergoing disintegration, is not paralleled in any other order of insects. I contend that specialization, as deduced from the ontogeny of the insect, is the best and only reliable criterion of rank. Let those who believe otherwise point out a better one. To talk of an intellectual development in insects is absurd. I do not admit that the actions of the social hymenoptera are in any way actuated by reason or intellect. It is, rather, inherited habit.

As to the ubiquitousness of the House-fly, this is rather a point in its favour. It has, entirely on its own resources, become emphatically cosmopolitan, and even man "in all his glory" is unable to reduce its numbers, or in any way to cope with it. On the other hand, the Honey-bee has for ages been cultivated, cared for and protected by mankind. Yet I would not by any means suggest the House-fly as the climax of insect development.

Man is the highest animal, because of his immense cerebral specialization. There is no such contrast in cerebral development between the lowest and highest insects as there is even between the anthropoid apes and man. Consequently I believe that the same factor should not be used as a criterion of rank in insects. At the same time, man is farthest removed from the ancestral mammalian form in his general structural development, as deduced from his ontogeny, and this can and should be used as the basis of argument, not only in insects, but in all other groups of animals.

This line of reasoning puts the Diptera at the head of the insect body, inasmuch as their larval stages show greater specialization or development than the larvæ of any other order of insects, while their perfect form points them out still more emphatically as the farthest removed from the ancestral thysanuriform type.

If there is an objection on the part of some to the term "highest", let the expression "most specialized" be substituted therefor. I cannot help believing that the use of the latter would be preferable.

A NEW ARRANGEMENT OF THE COLEOPTERA.

BY WM. HAMPTON PATTON, HARTFORD, CONN.

Coleoptera may be described as Mandibulate Insects, with the fore-wings horny and the two basal abdominal joints invisible on the venter.

A reduction in the number of abdominal joints at the tip and in the number of joints in the tarsi indicates advancement in rank among Coleoptera. Likewise, a specialization of the antennae to clavicorn or lamellicorn indicates advancement, as well as does the degradation of the larva. The Lampyridæ are the lowest in rank, shown by their lax structure. The Heteromera and Phytophaga show high development in the specialization of their tarsi. The Rhynchophora are especially aberrant, and there is evidence of advanced type shown in the low development of the apodous larvae, greatly specialized prosterna and concealed ventral segments. A few Heteromera, the Buprestinae and the Lamiinae resemble them in their larvae. The larvae of Bruchidae are similar to those of *Brenthus* and *Anthribus* in their minute legs. The Weevils may be placed ahead of the other Coleoptera, although the Chafers are nearly as high.

The Cicindelidae present a character not elsewhere found in the Dolichogastres, *i. e.*, a dilation of the metapleura. A similar, but more extended, dilation is characteristic of the Rhynchophora and Phytophaga.

The arrangement below is verified in the preceding paragraphs.

SYNOPSIS OF COLEOPTERA, TWO SERIES.

DOLICHOGASTRES.—Six or more ventrals visible (exc. Elateridae and Buprestidae).

= Metapleura not widened (exc. Cicindelidae). Pentamerous (Normopleura).

First visible ventral entire. Series *Serricornia* (Malacodermes, Sternoxi). Series *Monilicornia* (Brachyelytra).

First visible ventral divided by the coxæ. Series *Filicornia* (Adephaga).

BRACHYGASTRES.—Only five ventrals usually visible.

= Metapleura not widened. Six ventrals in many families (Normopleura).

Heteromerous. Series *Heteromera*. First visible ventral not divided by coxae. Antennae various.

Pentamerous.

Series *Clavicornia* (Philhydrida, Necrophaga).

Series *Pectinicornia*. Series *Lamellicornia*.

= Metapleura widened (Tetramera). Never more than five ventrals. (Platypleura).

Series *Phytophaga.*

Series *Rhynchophora.*

The conclusion which may be drawn from this synopsis is that the Tetramera are the equivalent of all other beetles taken together. Those who follow LeConte's views would place the Rhynchophora apart from all others; then the division would be into Tetramera and Pentamera, the last including the Heteromera and Trimera.

A GENERAL SUMMARY OF THE KNOWN LARVAL FOOD-HABITS OF THE ACALYPTRATE MUSCIDÆ.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

In a short paper published in the Trans. Kans. Acad. Sci., Vol. XIII., on the occurrence, in a single restricted locality in Arizona, of a species of *Micropeza*, I gave a very brief resumé of the food-habits of some of the better known families of Acalyptrate Muscidæ, with the view of suggesting the possible habit of the species there considered. This prompted me later to bring together all available notes on the subject. As these small flies are of much economic importance, both as being injurious and beneficial, I have felt that a quite complete summary of their larval food-habits would be of much use to the working entomologist, besides being of no little importance to those who may be making a special study of the diptera. I should acknowledge drawing a considerable number of the notes from Schiner, Westwood and other European authors. All such refer to European species, but often apply equally as well to American species, when such exist in the genera named. All are of importance as indicating the great range and variety of the food-habits in this section of the Muscidæ The only families of whose larval habits nothing seems to be known are the *Micropezidæ*, *Phycodromidæ*, *Opomyzidæ*, *Leiopsidæ*, *Asteiidæ* and *Geomyzidæ*.

According to their habits, the larvæ of the Acalyptratæ may be grouped in three categories: Scavengers, phytophagic species, and entomophagic or parasitic species. These groups may be separated into sub-groups, as will be seen from the accompanying synoptic view:

Synopsis of larval habits of the Acalyptrate Muscidæ.

- **Scavengers.**
  - Coprophagous species or dung-feeders.
  - Feeders on decaying vegetable matter.
    - In decaying fruits.
    - In decaying wood and under bark of trees
    - In decaying plants and leaves.
    - In decaying roots and tubers.
    - In fungi.
  - Feeding in fluids.
    - Salt or alkaline water and mud.
    - Urine.
    - Vinegar.
    - Sap from wounds of trees.
  - Feeders on animal matter.
    - Cheese.
    - Animal fats.
- **Phytophagic species.**
  - Gall makers.
  - Fruitfeeders
    - Infesting soft fruits.
    - Living in pods, seeds and berries.
    - Living in flower heads.
  - Leaf miners.
    - In water plants.
    - In foliage of trees and land plants.
  - Feeders in stems of plants and holms of grasses.
  - Root feeders.
  - Feeding in seaweed.
- **Entomophagic species, or group with a parasitic tendency.**
  - Parasites?
    - In scales.
    - In plant lice.
  - Pseudo parasites?
    - On scale insects.
    - On plant lice.
    - On larvæ.
  - Inquilines in bees' nests.

Summary of larval habits.

Fam. CORDYLURIDÆ:

Norellia spinimana; larva found on an anthomyiid larva (Bremi).

Cleigastra apicalis; larva in noctuid caterpillar (Boié). *Cl. suisterci;* bred from larvæ in swine dung (Townsend, CAN. ENT.)

Scatophaga; larvæ in dung and human excrement, also in water (Sch.).

Fam. THYREOPHORIDÆ:

Thyreophora; larvæ found in anatomical preparations (Rob. Desv.)

Fam. HELOMYZIDÆ:

Helomyza; larvæ in fungi and truffles (Westw.)

Leria serrata; larvæ in dung (Bremi), in fungi (L. Dufour).

Thelida; a species on bat dung (Rob. Desv.)

Fam. HETERONEURIDÆ:

Clusia; pupæ in mouldered tree trunks (Staeger).

Heteroneura; larvæ and pupæ under bark of trees and in decaying tree trunks. *H. albimana;* bred by Schiner from pupæ found in trunk of a weather-beaten willow.

Fam. SCIOMYZIDÆ:

Dryomyza; larvæ in fungi (Meq.)

Actora; breeds in seaweed (Boh.)

Tetanocera ferruginea; larvæ live between the leaves of Lemna and Callitriche in water (L. Dufour).

Fam. DORYCERIDÆ:

Dorycera; larvæ live amongst leaves of water plants, several species being subcutaneous (Westw.) *D. graminum;* larvæ in water (Geoffr.)

Fam. PLATYSTOMIDÆ:

Platystoma umbrarum: larvæ live in decayed wood underground (Perris).

Fam. ORTALIDÆ:

Herina (Ortalis) frondescentiæ: larvæ feed on pulp of cherry (Réaumur).

Tritoxa (Ortalis) flexa: larvæ live in onions.

Psairoptera: larvæ of a species found under bark of Pinus, and Populus tremula (Sch.)

Chloria (Ulidia) demandata: larvæ in old horse dung, where they passed the fall and winter (Bouché).

Chaetopsis aenea: bred from larvæ found July 5 burrowing in the centre of a stalk of corn (Gillette).

Fam. LONCHAEIDÆ:

Lonchæa nigra: larvæ in the stems of Verbascum, Angelica and Carduus. *L. parvicornis:* larvæ in suckers of Triticum repens, on which they cause galls with a scale-like covering, the dead leaf-sheath (Perris). *L. lasiophthalma:* larvæ under similar circumstances on suckers of Cynodon sp. Larvæ of other species under bark of trees (Giraud).

Fam. SAPROMYZIDÆ:

Sapromyza; larvæ under decayed leaves (Bouché), in rotten straw (Perris), and in fungi (L. Dufour).

Fam. TRYPETIDÆ:

Platyparea; larvæ of a species in asparagus (Sch.)

Euphranta; larvæ of a species in pods of Vincetoxicum officinale, pupating in the earth (Giraud).

Aciura femoralis; bred from larvæ found in Phlomis fruticosa (v. Frauenfeld).

Acidia; larvæ of a species in leaves, which they mine (Sch.) Larvæ of another species in fruit of Lonicera xylosteum (Lev.) *A. artemisiæ;* larvæ mine leaves of Chrysanthemum (Westw.)

Spilographa; larvæ in fruits or berries, while some mine leaves (Sch.) *S. alternata;* larvæ in berry of Rosa villosa (Bouché, quot. by Westw.)

Orellia wiedemanni; larvæ live in leaves of Bryonia (Sch.)

Trypeta; larvæ of many species live in flower heads of various compositæ.

Rhagoletis (Trypeta) pomonella; larvæ in apples (Wlsh.)

Acrotoxa (Trypeta) ludens; larvæ in oranges (Riley).

Eurosta (Trypeta) solidaginis; larvæ in galls on stems of solidago (Fitch).

Urophora; larvæ of many species live in various parts of composite plants (Sch.) *U. cardui;* larvæ in large galls on thistle (Westw.)

Myopites; larvæ in flower-heads of Mula sp. (v. Frauenf., v. Roser).

Ensina sonchi; larvæ live in flower-heads of Sonchus, Apargia, Senecis, Tragopogon, Podospemum (Sch.), Carduus (v. Frauenf.)

Carphotricha; larvæ live in Compositæ, preferably Ligulifloræ (Sch.)

Euleia onopordinis; larvæ mine in leaves of celery (Westw.)

Oxyphora; larvæ in flower-heads of various Compositæ (Sch.)

Tephritis; larvæ in flower-heads of Compositæ (Sch.)

Anomoia; larvæ of a species in berries of Crataegus oxyacantha (Sch.)

Ceratitis capitata; larvæ in peaches, oranges and other citrus fruits (Westw.)

Dacus oleæ; larvæ in olives, two or three larvæ in a fruit, pupating in the earth.

Eutreta diana ; larvæ in gall on wild sage, Artemisia tridentata, in Mo. (Riley, Osten Sacken).

Straussia (Trypeta) longipennis ; the fly oviposits in stalk of Helianthus (sunflower) near tip, in June and July (Lintner, 3d. Rep.)

Fam. SEPSIDÆ :

Nemopoda cylindrica ; larvæ in human excrement (Bouché, West., Sch.)

Themira putris ; larvæ in slimy water and mud (Sch.)

Fam. PIOPHILIDÆ :

Piophila ; larvæ in cheese, ham-fat and fatty animal matter in general (Swamm.). In salt (Germer).

Fam. PSILIDÆ :

Chyliza leptogaster ; bred from irregular galls the size of a walnut on the stems of Spiræa opulifolia—not known that the galls were caused by these flies (Scholtz).

Psila rosæ ; larvæ in roots of Daucus (carrot) and Brassica (Sch.)

Fam. OSCINIDÆ :

Platycephala ; pupæ of one species in reed stems (Boié)

Meromyza americana ; larvæ in stems of wheat, rye and probably in grasses (Riley, Webster and others).

Chlorops ; larvæ of several species live in holms of grasses and cereals. *Chl. pumilionis*, *Chl. glabra ;* larvæ injuring wheat (Bjerkander, Westw.)

Chloropisca prolifica ; supposed by Dr. Lintner to breed in grass of lawns (7th Rep. N. Y. Ent., p. 239).

Lipara ; larvæ in reed stems, causing large galls near the tops, in which they pupate (Sch.)

Oscinis ; larvæ live in holms of grasses and cereals. *O. frit ;* larvæ in husks of barley in Sweden (Linn.) Species in wheat in U. S. (Garman, Webster).

Siphonella ; larvæ in grasses, also in other plants (Sch.) Two species in flower-heads of various Cynerocephalæ (Egger, v. Frauenf. Larvæ of one species in worm-eaten nuts, in company with curculionid larvæ (Perris, v. Frauenf.)

Elachiptera ; pupæ on a species in large quantities under the bark of old poplars (Sch.)

Gampsocera; larvæ in decayed stems of Althea (H. Heeger).

? Novum genus; bred in California from a spider's egg-mass.

Fam. EPHYDRIDÆ:

Halmopota; larvæ in salt-pits (Bouché).

Ephydra; larvæ in salt-pits (v. Heyden), in salt-pits of Kissingen (Diruf). *E. californica;* larvæ live in great numbers in water of alkaline lakes in the south-western U. S. (Packard, Williston). *E. hians;* larvæ in immense numbers in water of Lake Tezcuco, in Mexico, and are used by the Mexican Indians as food. It may also be mentioned that the larvæ of E. californica are used by the Pah-Utes as food (Williston).

Teichomyza fusca; larvæ live in urine (Rob. Desv.)

Fam. DROSOPHILIDÆ:

Aulacigaster; larvæ of only species found in wounds on elm trees (L. Dufour).

Gitona; larvæ of only species live in flower-heads of Sonchus arvensis (Loew), probably also in flower-heads of Onopordon (Sch.)

Drosophila; larvæ usually in sour-fermented matter, fermented liquids, vinegar, decayed fungi, ulcerated wounds of trees, decayed fruits (Sch.) *D. ampelophila;* larvae in pomace of cider mills, in pickled and preserved fruits (Lintner), bred from maggots found hollowing out grapes (Forbes). *D. quinaria;* bred from a mass of cochineal insects (Riley & Howard). Some species (Scaptomyza Hardy) are leaf-miners (Sch.) One or more species mine turnip leaves in Europe and U. S. (Curtis, Garman).

? Stegana; breeding in hen dung (Riley & Howard, Ins. Life, II., 254). It is perhaps doubtful whether this fly belonged to the Drosophilidae.

Fam. OCHTHIPHILIDÆ:

Leucopis; larvae parasitic (?) on plant lice and scale insects, (?) in spiders' nests (Sch.) *L. bellula;* reared from cochineal insect (Riley & Howard). *Leucopis* sp.; parasitic (?) on Rhizococcus sp. on grasses in Nova Scotia (Fletcher).

Lestophonus iceryae; parasitic (?) on Icerya (Riley).

Fam. MILICHIDÆ :

Cacoxenus indagator ; larvae live in nests of Osmia emarginata, consuming the food prepared for the Osmia larvae and causing them to die (Giraud). Probably found in other bees' nests (Sch.)

Fam. AGROMYZIDÆ :

Agromyza ; larvae are leaf-miners or live in pith of plants (Sch.) *A. tritici ;* bred from larvae crawling in large numbers from unthreshed wheat in a barn (Fitch).

Ceratomyza ; larvae of one species mine leaves of Sonchus oleraceus (Sch.)

Fam. PHYTOMYZIDÆ :

Phytomyza ; larvae are leaf-miners (Sch.), some species pupating in the parenchyma of the leaf (Chromatomyia Hardy). *P. chrysanthemi ;* larvæ mine leaves of Chrysanthemum, Tanacetum, Eupatorium, Gazania, Helianthus, Cineraria (Lintner). *P. lateralis ;* larvae live in heads of Anthemis, Pyrethrum, and in stems of Centaurea, Verbena and Urtica (Kaltenbach), mining in Sonchus (Gourean). *P. flava ;* larvae in subcutaneous mines in leaves of Scolopendrium vulgare, a fern (Doubleday). *P. flaviceps ;* larvae mine leaves of woodbine (Hal.) *P. obscurella ;* larvae mine leaves of holly (Hal.), in honey suckle (Glover). *P. nigricornis ;* larvae mine in underside of leaves of turnip, peas, forming long galleries in parenchyma beneath lower cuticle, pupating at end of gallery (Curtis), also mine leaves of monkshood, Aconitum (Kaltenbach).

Fam. BORBORIDÆ :

Borborus ; larvae in dung and decayed fungi (Haliday).

Sphaerocera ; larvae live in horse dung (Sch.)

Limosina ; larvae of a species in Confervae, in diseased potatoes, and in fungi (Sch.)

NOTE.—If any genera whose larval habits are known have been omitted, or if any peculiarity in habit of a genus here mentioned is not included, the author will be glad to know of the references or observations. The list is not supposed to be complete.

LARVÆ OF PAPILIO PHILENOR BECOMING LARVOPHAGOUS.

BY RICHARD E. KUNZE, M. D., NEW YORK.

"I perish by my art; dig mine own grave;
I spin the thread of life; my death I weave."

Truly wonderful is the adaptability of some individuals when placed under circumstances tending to diminish the reproduction of their race. Desirous of raising larvæ of *Papilio philenor*, I planted two years ago five vines of Dutchman's Pipe (*Aristolochia sipho*) in my back yard, which in the summer of the present year (1892) covered a wall and fence 16x7 feet with luxuriant foliage.

July 2nd a friend brought me, from Staten Island, N. Y., from 125 to 150 larvæ of *Philenor*. The majority had passed their first, and a few their second moult. All were transferred to the leaves of the Dutchman's Pipe vine in my garden plot. By the ninth of July nearly all the leaves of my Pipe vines were devoured, before less than half of the leaves were full grown. I then removed fifty of the largest to a five-gallon flower pot, covering the bottom with a layer of loam, and filling up this breeding cage with as many leaves of *Aristolochia sipho* as it would hold. The pot and loam were first well sprinkled with water to furnish moisture for stems of *Aristolochia* vines, and the top covered with thick manilla paper to prevent evaporation, inasmuch as the porosity of the cage answered every such purpose. Two days later the leaves of breeding cage were all devoured, and those on my vines in the garden nearly so. I divided what remained of the latter, and gave an equal share to larvæ in the cage. Exactly forty-eight hours afterward the Pipe vines of the garden were entirely defoliated, and the larvæ contained in the flower pot nearly all transforming into chrysalids.

Two days previously I requested my friend, Mr. Ehrenberg, who furnished the larvæ, to procure me a supply of *Aristolochia* leaves from Staten Island, where he officiated as landscape architect at a well-known villa, else most of our larvæ would perish. In the meantime the owner of the villa noticed the foliage of his *Aristolochia* trellis disappearing rapidly, caused by the remaining larvæ which my friend had failed to take off for me. His,(the owner's) instructions to the resident gardener to keep these larvæ well picked off had not been observed, he thought, while the landscape architect tried to raise a few more chrysalids on the trellis facing the

villa, and suggested to the gardener to defer operations a few days longer. The owner, not knowing of our intentions, became vexed and gave an Italian labourer a bagfull of sulphur, with orders to dust the *Aristolochia* with it effectually. How well the instruction was carried out may be inferred when it is known that those plagued worms, all the remaining foliage and much of the grass beneath the vines, were totally destroyed!

At the same time, while in expectation of an abundant supply of larval food, I had collected from the bare vines, wall and fences of the yard, from the passage ways of the house, and wherever they wandered in search of food, some sixty hungry larvæ. These were put into a lady's large bonnet box, and some fifteen different food plants which grew on the premises were placed therein to serve that wriggling mass of large black larvæ with long concolorous tubercles their immediate wants. But touch it they would not. On the evening of the ninth of July my friend returned from Staten Island without any food plant, and informed me of our misfortune. I knew of only two more private places in this city, and another in Astoria, Long Island, where *Aristolochia sipho* is cultivated. Not being acquainted with the owners, I could not obtain a supply.

The children of neighbours brought me numbers of my *Philenor* larvæ which had crawled into their yards and gardens. I decided to keep only the largest of these famishing larvæ, thinking to obtain a few more chrysalids while waiting for a possible supply of food plant, which, however, did not come. All others I gave liberty to go where they pleased. Many returned to the bare stem of my *Aristolochia*, where they nibbled at the epidermis of the vines until most had perished.

Necessity compelled the larvæ I had in that bonnet box to become *Entomophagous*, so to speak. Not a leaf of a plant, shrub or tree, wild or cultivated, would they eat. On the 11th of July I observed several of the caged larvæ had spun a thread of silk across their bodies and were suspended by their anal hooks from the sides of the cage. A number of other hungry larvæ were attacking and devouring their own kind which were helplessly "hung up" and could not escape from the onslaught of these carnivorous larvæ. On the next day I discovered a few chrysalids suspended from the box, which during transformation had escaped attack, while others were being devoured. But before they hardened sufficiently to permit of removal these chrysalids, too, were attacked and converted into food! It was a disgusting and repellant sight to witness. From day

to day this larval cannibalism continued to enable a number of individuals to transform into the second stage. When the chrysalis was not at once removed it would soon disappear, excepting only the outer case. Sometimes 3 or 4 larvæ would attack a suspended larva at the same time, and whenever a dismembered portion of the victim fell to the bottom of the cage other larvæ would seize and devour it. A dozen larvæ and as many chrysalids were eaten up in four days, and not even the skin of a larva would remain. Thermometer ranged from 80° to 92° in the shade, but no sign of decomposition was noticeable in cage. It was dog eat dog, and not even bones left to tell the tale!

July the 16th only nine larvæ were left, and two chrysalids transformed the previous day were in an unsightly condition—literally disemboweled. All of these larvæ were very lively, but whenever ready to transform would never be more than two-thirds the size of those naturally fed. One more unfortunate hung by its anal feet to become the next victim in order. July the 19th three larvæ were alive, of which one was "spinning the thread of life". I again placed 8 or 10 kinds of food plants in the cage, which in twenty-four hours were untouched. One chrysalid was left intact. I now placed the remaining two larvæ on my *Aristolochia* vines, inasmuch as a new growth of leaves was in sight. These immediately fed upon the tender food offered. A number of others, barely alive, were nibbling away at the bare vines lower down on the plants, and had not yet discovered the new foliage.

Altogether these were a most carnivorous lot of larvæ, from which I obtained only five chrysalids out of a possible twenty-five larvæ retained in that cage. From one of these emerged, in September, a ♂ imago of the normal colour, but smaller in size.

I am not aware that larvophagous caterpillars have been reported as occurring among Rhopalocera. In the *American Naturalist*, Vol. XX., page 556, it is stated that a Lycænid larva of *Feniseca tarquinius* feeds upon an Aphid which is found only on the branches of alder *(Alnus serrulata)* affecting swampy localities. One of my liberated *Philenor* larvæ fed upon a cultivated plant of *Azalea indica*, which was a potted plant fifteen inches in height. I discovered the chrysalid in September, and this was the only exception as far as I could discover where these had not fed either upon *Aristolochia sipho* or their own kind.

SYNOPSIS OF THE ASILID GENUS ANISOPOGON.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

The following table includes those species of *Anisopogon* at present known to occur in this country north of Mexico :—

1.—Scutellum (except sometimes its extreme base) black.....2
Scutellum and face yellow, abdomen yellow, marked with five black fasciæ, wings pale yellow.....*vespoides*, Bigot

2.—Abdominal segments one to four wholly black.....3
Abdominal segments three to six (except sometimes their lateral margins) reddish.....5

3.—Wings pure hyaline, the cross veins and furcations alone sometimes clouded with brown ; tibiæ reddish.....4
Wings more or less brown, the apex never blackish....*ludius*, n. sp.
Wings having the apical half blackish..... { *phœnicurus*, Loew. / *gibbus*, Loew.

4.—Pollen of abdomen extending on the bases of the segments .....*senilis*, Bigot.
Pollen confined to the apices of the segments.....*lautus*, Loew.

5.—Wings nearly uniform, smoky-gray ; head, first two joints of antennæ, thorax and legs obscure brown.....*rubidus*, n. sp.
Wings smoky-brown, darkest on apical half; head, antennæ and thorax black.....*patruelis*, n. sp.

Anisopogon ludius, n. sp. ♂.—Black, the tibiæ and tarsi dark reddish-brown. Face gently convex, white pilose, bristles of lower part black ; first joint of antennæ slightly longer than the second, the third joint tapering to the tip, three times as long as the second, the style slender, seven-eighths as long as the third antennal joint ; pile of occiput, thorax, pleura, coxæ and venter white ; upper side of each front tarsal joint with a dense covering of appressed white hairs ; upper side of middle femora toward its apex with a dense covering of short appressed black hairs, which, however, leave a large elliptical naked space between the apex and the middle ; middle tibiae white pilose in front, and above the middle ornamented with a large patch of appressed black hairs and bristles, which form an inner and an outer fringe; inner side of hind tibiae near the tip, and also of the hind metatarsi, densely bright yellow pubescent ; wings smoky brown, lightest at the apex and along the hind margin ; all posterior and the anal cell open.

♀ as in the male, except that the front tarsi, middle femora and

tibiae are not ornamented as in the male, and the wings are much lighter, the brown forming a border to some of the veins. Length, 12-16 mm. Los Angeles and San Bernardino Counties, California, and British Columbia. Two males and three females, in May. The British Columbia specimen was received from Mr. W. A. Danby.

This species is closely related to *A. senilis* Bigot, but in the latter species the wings are wholly hyaline, and the appressed white hairs on the front tarsi of the male are confined to the first joint. I have specimens of the latter species from Colorado and Florida (Morrison). In both species, the colour of the bristles on the head, body and legs is too variable to be of any value in separating the species.

Anisopogon rubidus, n. sp. ♀.—Obscure brown, the following parts black :—The third antennal joint, basal half of style, proboscis, palpi, scutellum except its base, first segment of abdomen, basal half of second, lateral margins of the others, seventh segment and genitalia largely, apex of venter and upper side of each femur, that on the first and second segments of abdomen with a strong bluish tinge, brown of abdomen more reddish than on the other parts ; thorax irregularly marked with grayish black. Head gray pollinose, the pile yellowish-white ; face evenly convex, the pile extending nearly to base of antennae ; first joint of antennae slightly longer than the second ; third joint slightly longer than the first two taken together, tapering gradually to the apex, the style two-thirds as long as the third joint. Thorax gray and golden pollinose, the pile short, sparse, mixed black and white ; pleura gray pollinose, its pile and that of the coxae white, the fan-like pile in front of halteres also white. Pile of abdomen sparse, microscopic, light-coloured, that on lateral margins and on venter longer, whitish. Pile of legs sparse, whitish, that on tarsi and tips of tibiae largely black. Wings smoky gray, all posterior cells and the anal cell open.

♂ same as the ♀, except that the middle femora have each a cluster of black pile at its apex in front and two similar fringe-like clusters, one on the upper, the other on the lower surface at its last third, and above the middle of each middle tibia are two long dense fringes of black pile on its inner and outer sides, connected with each other in front ; front metatarsi destitute of appressed white pile. Length, 14 to 17 mm. Los Angeles County, Cal. Four females and one male.

Anisopogon patruelis, n. sp. ♂ ♀.—Same as the above description of *rubidus*, with these exceptions :—Head, antennae, thorax, scutellum and

femora, except the apex, black ; apical third of the first abdominal segment and the apical three-fourths of the second segment reddish in the female, but black in the male. Style one and a-fourth times as long as the third antennal joint. Wings smoky brown, lighter on the base as far as the furcation of the second and third veins ; a lighter transverse shade passes through the middle of the discal cell. Front metatarsi of the male densely covered with appressed white hairs above. Length, 13 to 16 mm. Texas. A single male and female received from the late H. K. Morrison.

THE LARVA AND CHRYSALIS OF CHRYSOPHANUS DIONE.

Some time ago Mr. Henry G. Willard, of Grinnell, Iowa, very kindly sent me some of the full grown larvæ of this species. I made a few notes at the time which may be of use, owing to the fact that nothing has been published in regard to the early stages of this butterfly. The food plant at the home of the insect is *Rumex longifolius*, but they readily ate our common species of dock found here. The full grown larva were onisciform in shape, grass green in colour, and 20 mm. in length. Most of them had a narrow, claret-coloured dorsal stripe, and the entire body, under a glass, was seen to be clothed with minute black hairs. The larva is of the same general appearance as that of *Chrysophanus hypophleas*, but larger. The chrysalis is the same shape as most others in the Lycænidæ, and looks very much like Scudder's figure of the chrysalis of *E. thoe*. In colour the chrysalis is a light hay colour, and the dorsal abdominal segments are heavily marked with blackish blotches. The dorsal thoracic segments are peppered with black spots. The wing covers are lightest in colour of any part, but are also peppered with the fine black points. The head, eyes and shoulder-joints are covered with black blotches. One chrysalis, which I think was entirely green and without the black markings, disclosed a *C. thoe*, but I did not notice any difference in the larva I had, so I conclude the larvæ of the two species look very much alike. Mr. Willard could perhaps give us something interesting about the times of appearance and habits of this butterfly, as it is common in his locality.

HENRY SKINNER, M.D., Philadelphia.

NOTES ON ZARÆA AMERICANA.—CRESS.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

The young larva of *Zarœa Americana* appears in the beginning of July on *Menyanthes trifoliata*. It lies curled on the underside of the leaf. Its head is black, and its body lead-colour above and greenish-white beneath. It develops into the most beautiful larva of any of the Tenthredinidae that I am acquainted with.

Description of the full-grown larva.—Length one and a-quarter inches. Head black. Body above lead colour—excepting the anal segment, which is greenish white. The underside and the legs are greenish-white. The forelegs are tipped with black. Along the back are eleven pairs of raised and conspicuous bright yellow spots. Between the pairs, and on either side of them, are conspicuous jet-black spots, which, taken with the yellow ones, form rows across the back. There are other rows of *smaller* black and *pale-yellow* spots—two after each row of the larger ones. The side lines are white. Above these lines, on the margin of the lead-colour, is a row of black dots. Beneath them, just above the legs, is a series of raised yellow spots—each spot being surmounted by one or two black dots.

The larvae were plentiful in one spot, but could hardly be said to be *gregarious*, as only one or two were to be found on a plant. Towards the end of July the larva spins around itself a closely woven, dark-brown cocoon. In the spinning it usually gathers several leaves of the plant about it. The larva remains unchanged in the cocoon till spring, when it assumes the pupal state. The fly makes its appearance in the middle of May.

Description of the perfect insect.—In length the fly measures about nine-twentieths of an inch; and in expanse of wings about eighteen-twentieths. The antennae are dark brown, six-jointed and clavated. The wings are faintly clouded with brown. The head and thorax are dark brown and hairy. The abdomen, which is oval in outline, is of a rich velvety-brown above, with a slightly bronzy-green lustre. The colour fades into light reddish-brown on the sides and on the two last segments. The underside of the abdomen is pale brown. The tibiae and tarsi are white, and have a waxen appearance. The fly seems to be somewhat sluggish in its habits.

I am indebted to Mr. E. T. Cresson for the identification of the insect.

A NEW FORM OF PRIONIA, AND NOTES ON PLATYPTERYX ARCUATA AND P. GENICULA.

BY GEORGE H. HUDSON, STATE NORMAL SCHOOL, PLATTSBURGH, N. Y.

Prionia levis, n. var. or sp.

Primaries without the delicate frosted or silvery appearance, and without the numerous short, fine, strigate, brown lines of *bilineata*. The brown scales are present, but are uniformly and evenly distributed, save where they form the two brown lines which cross the wing, and a little darker shading near the outer edge and apex. These two transverse lines are about a third wider apart than in *bilineata*, the second narrowly edged externally with the clear, pale yellow ground-colour of the wing. There is no brown submarginal line, but a wavy, pale yellow line runs from inner margin to costa, midway between the second line and the outer margin. The vestiture appears to be more dense and smooth than in the allied form. Both primaries and secondaries seem to have a more decided ochreous tint.

Underside with markings more obscured.

Described from one male taken Aug. 13, 1887, and one female taken Aug. 3. 1890; both from the electric lights.

This may prove to be a seasonal form of *bilineata*. My dates of capture for the latter, since 1886, are as follows (the figure after the hyphen giving the number of specimens). May 8, 10-2, 15-3, 19; June 16, 22-2, 30.

Mr. H. G. Dyar, while here last summer, suggested that this new form might be the one which the late Mr. Hy. Edwards (CAN. ENT., XIX, 146) referred to *P. lacertinaria*, Linn. (=*lacertula*, Den. and Scheiff.). Both *P. bilineata* and *P. levis* are distinct from the European form, although very closely allied to it. Mr. Dyar also called my attention to the fact that this form seems to vary somewhat after the manner of *Platypteryx genicula* from *P. arcuata*, as pointed out by Dr. Packard in "Proceedings of the Boston Soc. Nat. Hist.", Vol. XXIV., page 491, 1890. We separated the two forms and then looked up the dates of capture, with results as follows:—

Platypteryx arcuata.—May 10-2, 11, 16-2, 19, 21-2, 24; June 1-2, 3, 9; July 27.

P. genicula.—July 7, 13, 27-3, 28-2, 31-2; Aug. 2-4, 3-2, 14.

FEMALE OF CROCOTA ROSA, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

In describing this species in Vol. XXII., page 133, of the CANADIAN ENTOMOLOGIST, I had before me two males, one from Texas and one from Ohio. I have now before me a fine fresh female from Champaign, Ill., the first of this sex I have seen, and I will give here some additional characters of the species. The forewings are fawn, a little darker than in the type, but the latter was evidently a little faded. The hindwings have a few dusky scales in the outer border near the anal angle. On the forewings the veins are a trifle darker than the spaces between the veins, but only from the wing being thicker here. Antennae a shade darker than the forewings; a semi-ring back of the eyes that is red tinted, as also the underside of the palpi; upper side of tibiae a little more red tinted. Abdomen above concolorous with the hindwings, an obscure row of dorsal dusky spots; whole of underside of body concolorous with upper side of forewings.

CORRESPONDENCE.

A CORRECTION.

Sir,—On page 225, CAN. ENT., 1892, I described a new Bombycid genus, *Melia*. Finding that this name is preoccupied, I have changed it to *Eumelia*, calling the insect proper *Eumelia Danbyi*, Neum.

B. NEUMOEGEN.

HONEY-BEE OR HOUSE-FLY.

Sir,—The November number of your journal contains upon its first and second pages some rather misleading comments on an article of mine in *Scienee*, of April 29. There was nothing in the article to justify the intimation that I had arranged any insects in a "linear series." The article was in the main a re-statement of Hyatt and Arms's view of the systematic position of the Diptera. To this I added several considerations tending to reinforce their conclusions. I referred to their placing "the Hymenoptera second and the Lepidoptera third," but this does not necessarily imply anything "linear." See their book "Insecta."

So far am I from holding the views imputed to me that I prefer not to regard any of the groups as representing "parallel branches," believing that "we should make an effort to avoid the expression of lineal rank in groups of animals."

I purposely based my conclusions upon anatomy alone, because, as I said, "to introduce the subject of instinct or of usefulness to man, is to confuse our ideas, for we cannot translate the data furnished by such a criterion into terms of the other standard." Judged from that position, it is very much out of the way to assert that "mere specialization is never a test of rank in itself." All that I tried to show was that, anatomically considered, the Diptera are the most highly specialized order.

I trust that it is not out of place to add that the author of one of our principal introductions to entomology, a man whose opinions have as great weight as anyone's in this country, informed his class in entomology last summer that he had come to the conclusion that the Diptera are the highest order. I was so informed by one of his students.

J. M. ALDRICH.

Brookings, South Dakota, Nov. 11, 1892.

NOTES.

MELANCHROIA CEPHISE, HÜBN

The genus *Melanchroia* has been associated in our lists with *Gnophaela* to form a family *Pericopidæ*. As a matter of fact it is a veritable geometer, with little more relation to *Gnophaela* than is expressed in the statement that both are Macro-Heterocera! This has, indeed, been recognized in Europe, and Mr. Butler, when identifying my specimens as *M. cephise*, added the remark "belongs to the geometrites".

M. cephise is very common in Kingston, Jamaica, and on Aug. 5, last year, Mr. Bowrey kindly gave me a number of the larvae. These were of the usual form of geometrid larvae, and from them I drew up the following description:—

M. cephise: Larva about 22 mill. long, body smooth, with a few short hairs, which are hardly visible without a glass. Head yellow-brown, the mouth parts dark. Thoracic legs yellow-brown. Abdominal legs tinged yellow-brown. Body pale yellow, with a black ring on each segment, which extends downwards only as far as the infraspiracular line (except that on the 4th body segment, which is continuous below). These rings are broad on the 4th to 8th body segments, but rather narrow on the others. There is a longitudinal, narrow black subdorsal line, and a black infraspiracular line, which broadens into triangles (which are spotted with white) at the junctions with the black rings. The edges of all these black bands are whitish.

The very young larvae are marked in similar way to those which are mature. The pupa is brown and rather shiny. The moths began to emerge on Aug. 15th.

T. D. A. COCKERELL,
Institute of Jamaica, Kingston, Jamaica.

HALISIDOTA MACULARIA, WALK.

I find on further search that *H. maculariа*, Walk. (see CAN. ENT. Vol. XXIV., p. 306), is made a synonym of *Alpenus maculosus*, Stoll., whose habitat is given as West Africa. The citation of it from North America can only be the result of an error. The occurrence of *Halisidota megapyrrha*, Walk. (= *Ammalo helops*, Cram.), is also doubtful, though not so much so, as its home is in Surinam.

HARRISON G. DYAR, Roxbury, Mass.

ASTATUS BICOLOR, SAY.

In the excellent synopsis of the difficult genus Astatus, by Dr. William J. Fox, published in the September number of this journal, I believe that gentleman to be in error as to his identification of *A. bicolor*, Say. This is an undersized species, not uncommon in Illinois, having the stigma and the contiguous portion of the submarginal vein of a yellowish rufous colour—"pale rufous", Say writes—and not black, as Dr. Fox states; the legs black, as usual. The species described by Dr. Fox as new, under the name *pygidialis*, appears from the description to agree closely with *bicolor*, scarcely differing except in the rufo-testaceous colour of the legs and on the clypeus and antennal scape, which parts are black in *bicolor*. It is possibly an extreme variety of the latter species. I would arrange the synonymy of this group as follows:—

ASTATUS RUFIVENTRIS, Cress.
♀ *rufiventris*, Cress. Trans. Amer. Ent. Soc. IV., p. 218.
bicolor, Fox. CAN. ENT. XXIV., p. 232.

A. BICOLOR, Say.
♀ ♂ *bicoior*, Say. Lec. Ed., I., p. 166.
terminata, Cress. Trans. Amer. Ent. Soc. IV., p. 218.

A. PYGIDIALIS, Fox.
pygidialis, Fox. CAN. ENT. XXIV., p. 234. (? = var. of *bicolor*.

CHARLES A. HART, Champaign, Ill.

BOOK NOTICES.

HISTOIRE NATURELLE DES ARAIGNEES: Deuxième Edition, Par Eugène Simon: Librairie Encyclopédique de Roset, Paris, 1892.

The first portion of Vol. I of this most important work has just appeared (pp. 1–256). The work will be divided into four parts: 1. External Anatomy; 2. Classification; 3. Biology; 4. Geographical Distribution. Simon arranges the known spiders of the world in 41 families; three families under the suborder *Araneæ theraphosæ;* the remaining families under *Araneæ veræ;* the latter is divided into two

sections—the *Cribellatæ*, with eight families, the *Ecribellatæ*, with thirty families. This portion of Vol. I. contains the External Anatomy and the classification of the *Araneæ theraphosæ* and the *Cribellate* section of the *Araneæ veræ*. The text is illustrated with outline figures. There is no key to the families, but under each family there is a key to the genera, after which follow descriptions of the genera and various remarks. The descriptions of the genera and the keys are in Latin ; the rest in French. Although the classification will, of course, change from time to time, this work will be for many years to come a most important work for arachnologists, and should be found in every college library throughout the world. —N. B.

A Synonymic Catalogue of Lepidoptera Heterocera (Moths) by W. F. Kirby, F. L. S., F. E. S., etc., etc.: Vol. I., Sphinges and Bombyces. London: Gurney and Jackson, 1 Paternoster Row: 1892.

This forms a large volume of 950 pages, including the Sphinges and Bombyces of the world, and brought down to May 1, 1892. There are twenty-nine families recognized, of which the Sphingidæ form the twenty-first, preceded by the Notodontidæ and followed by the Bombycidæ. The Castniidæ head the list, including as the only North American species, the genus Megathymus, heretofore classed among the butterflies. The genus Lagoa, which Dr. Packard has recently proposed should form the type of a new family, is placed in the Liparidæ, between Parorgyia and Orgyia, a most peculiar location. A number of names, long since referred to the synonymy, reappear under their original generic titles in a very misleading manner, as, for example, *Arctia bimaculata* Saunders, placed between *A. f-pallida* Stets. and *A. Nais* Dru., in the genus Apantesis Walk. One would hardly look for *Crocata quinaria* here. On page 36 is a curious error, whereby the noctuid genus *Euedwardsia*, Grote, proposed for *Xanthotrix Neumoegeni*, Hy. Edw., is made to stand for *Edwardsia brillians*, Neum. As both generic names are thus pre-occupied, the Agaristid genus may be known as *Eupseudomorpha* But errors of this kind are hard to avoid in a work of the size of this one ; and the arrangement of the moths of the world under a uniform system of classification makes possible a revision of our North American species to correspond with it. The correction of certain errors in the location of species, with which Mr. Kirby is necessarily autoptically unacquainted, can easily be made, and Mr. Neumoegen and myself have already started on this work.

Harrison G. Dyar.

Mailed January 5th.

The Canadian Entomologist.

VOL. XXV. LONDON, FEBRUARY, 1893. No. 2.

CANADIAN HYMENOPTERA—No. 2.

BY W. HAGUE HARRINGTON, OTTAWA.

COLEOCENTRUS CANADENSIS, n. sp.

Female.—Length, 20 mm. Black, with red legs. Head transverse, as wide as thorax; cheeks as wide as eyes; face slightly swollen below antennæ, clothed with short pubescence, and with the inner orbits faintly yellowish below; palpi and inner edges of mandibles and labrum rufous; vertex and cheeks polished, the area of the ocelli without noticeable depressions or sutures; antennæ long and moderately thick, the joints about forty and subsequal. Thorax polished above; the lobes of the mesothorax prominent, the central sulcate; pleuræ and pectus rugose or subaciculate, but without definite striæ; scutellum moderately large and elevated; metathorax with acute carinæ; the area enclosed by the two discal carinæ about twice as long as wide; in the area enclosed by the two lateral carinæ the elongate spiracle may be plainly seen almost in centre; the areas between lateral and discal carinæ transversely rugose; legs slender with robust coxæ, entirely rufous with exception of hinder tibiæ and tarsi, which are somewhat brownish; wings faintly yellowish, stigma and nervures brown, areolet small, triangular and pedicellate, receiving the recurrent nervure at outer angle. Abdomen sessile, robust, brown rather than black: first segment twice as long as wide, not much expanded posteriorly, faintly sulcate above, with indistinct lateral carinæ; remaining segments shorter, subequal, margined at apex (except last) with pale yellow; the terminal segment compressed and curved so as to partly embrace the ovipositor; ventral scale very large, partly covering three apical segments; ovipositor as long as body, piceous, the sheaths piceous black, very finely pubescent.

Captured at Casselman, about thirty miles south-west from Ottawa, on the 26th June, 1883.

I have much pleasure in describing this insect, as the species of Coleocentrus are rare in collections. All the American forms have been described from Canada, and so far these insects seem to have been found, with one exception, only in our territories.

During a visit to Sudbury, on the 16th of last June, with Mr. Fletcher, we were so fortunate as to take five examples of the fine species described by Mr. Cresson in Vol. I., page 35, of the CANADIAN ENTOMOLOGIST, and named after Mr. Pettit. I find no record of its occurrence during the score of years which has since elapsed, and the two females taken by Mr. Fletcher and the three males which I secured are therefore highly prized. The females were flying near the ground among the fallen timber, upon which they were also seen to alight, and in addition to those captured two or three escaped owing to the rough nature of the ground. The males were hovering about bushes, and were not at first recognized as belonging to this genus, as they differ so much in the shape of the abdomen and in method of flight. A female was also taken by Mr. Evans during our stay with him. As the male has not been described, if indeed previously captured, I append its description in such characters as it differs from the female.

COLEOCENTRUS PETTITII, Cress.

Male.—Length, 17 to 20 mm. Black, shining. Face below antennæ, scape of antennæ beneath and palpi yellow. Antennæ black, nearly as long as the body, the joints both longer and more numerous than in ♀. Legs varying slightly in colour but much paler than those of ♀; the anterior and middle legs, including the tips of coxæ, are almost yellow, as also the posterior tarsi; posterior femora and tibiæ pale rufous, with a more or less defined black stripe down the tibiæ behind. Abdomen slender and compressed laterally, as in some Ophionids; the first segment much narrower than in the ♀; the apex of the last dorsal segment shaped as in ♀.

The posterior tibiæ of the females are not black as in the specimen described by Cresson, but rufous or brownish with a black line externally, as in the ♂.

Our species may be tabulated as follows:—

Head, thorax and abdomen mostly rufous..... *C. rufus*, Prov.

Head and thorax black; abdomen black or brownish.

Antennæ with yellowish annulus..... *C. mellipes*, Prov.

Antennæ black.

Legs, including coxæ, brownish fulvous.. *C. occidentalis*, Cress.
Legs rufous, coxæ black..... *C. Pettitii*, Cress.
Legs rufous, coxæ rufous..... *C. Canadensis*, n. sp.

Of the above species, *occidentalis* is recorded from Vanc. Island, and has been taken in California by Mr. Koebele; *mellipes* from the Rocky Mountains; *rufus* from Quebec (?), and *Pettitii* and *Canadensis* from Ontario.

Another fine genus of the Pimplinæ is Ecthrus, the species of which in general appearance much resemble those of Coleocentrus. The females, however, may be readily distinguished by the absence of the large ventral scale, and by their inflated anterior tibiæ. The shape of the areolet and of the last dorsal segment of the abdomen will separate the males.

ECTHRUS RUFOPEDIBUS. n. sp.

Female. Length, 20 mm. Black, with red legs. Head entirely black; face rugosely punctured and opaque; cheeks and vertex polished, but distinctly punctate; labrum and mandibles polished; palpi black; antennæ long and slender; third, fourth, and fifth joints long, subequal, a white annulus extending from middle of sixth joint nearly to apex of tenth. Thorax immaculate; lobes of mesothorax prominent, polished and punctate, as is also scutellum; pleura and metathorax coarsely rugosely sculptured, posterior transverse carina of metathorax distinct, but areas of disc not clearly defined; wings sub-hyaline, nervures and stigma black, areolet large, pentagonal; coxæ, trochanters and femora rufous, front tibiæ inflated, white, their tarsi almost rufous, middle tibiæ and tarsi brownish, the posterior tibiæ and tarsi black. Abdomen stout, basal segments strongly punctured, the first without distinct carinæ; ovipositor as long as body, rufous, sheaths black, scarcely pubescent.

This fine species was captured by Mr. Winn at Montreal on the 14th June, 1890.

I have prepared the following table for convenience in separating the twelve species of the genus.

FEMALES.

Wings smoky..... *E. ? maurus*, Cress.
Wings banded.
Legs rufous..... *E. nubilipennis*, Cress.
Legs black..... *E. luctuosus*, Prov.

Wings hyaline, or subhyaline.
Abdomen red.....*E. abdominalis*, Cress.
Abdomen red and black.....*E. Provancheri*, Prov.
Abdomen black and white.....*E. pediculatus*, Prov.
Abdomen black.
Antennæ brown, anterior coxæ black...*E. rubripes*, Prov.
Antennæ black, anterior coxæ red...*E. nigricornis*, Prov.
Antennæ annulate with white.
Ovipositor long.
Legs black.....*E. niger*, Cress.
Legs red.....*E. rufopedibus*, n. sp.
Ovipositor short.
First abdominal segment carinate,
.....*E. annulicornis*, Walsh.
First abdominal segment not carinate,
.....*E. canadensis*, Prov.

MALES.

Abdomen red.....*E. abdominalis*, Cress.
Abdomen black.
Legs black.....*E. niger*, Cress.
Legs red.....*E. nigricornis*, Prov.

Two of the species are described from the United States, viz., *annulicornis* from Illinois and *nubilipennis* from the Rocky Mountains in Colorado. Ottawa has furnished two, viz., *niger* and *abdominalis* communicated to Mr. Cresson by the late Mr. Billings, and described in CAN. ENT., Vol. I., page 37. Of the former of these, *niger*, I have taken 4 ♀ and 1 ♂, and have found the female ovipositing in decaying maples in June. Provancher also records this species from St. Hyacinthe, Que. The second, *abdominalis*, I have not succeeded in finding here yet, but I was so fortunate as to take a fine female at Sudbury on the occasion of the visit already mentioned. I have also received this species from Rev. G. W. Taylor, of Victoria, B.C., and his specimen agrees in every particular with that from Sudbury. The species *maurus* (doubtfully referred to this genus by Cresson) was described from Victoria, and *Provancheri* was also obtained by Mr. Brodie from Vancouver. The species now described, *rufopedibus*, is from Montreal, and the remaining species, all described by Provancher, are presumably also from the Province of Quebec.

SYNOPSIS OF THE ASILID GENUS BLACODES.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

Up to the present time but a single species of *Blacodes* has been described from the United States: *B. bellus*, Loew, from Texas. I give herewith descriptions of three other species, and present a table to aid in identifying them :—

1 Wings largely hyaline, abdomen and femora black 2
Wings black, abdomen and femora red .....*bellus* Lw.

2 Thorax destitute of a crest of hairs, scutellum bearing only two bristles, tibiæ yellow 3
Thorax furnished with a crest of hairs, scutellum bearing four bristles, tibiæ black .....*cristatus*, n. sp.

3 Anal cell open, second submarginal cell appendiculate .....*truncus*, n. sp.
Anal cell closed, second submarginal cell not appendiculate .....*clausus*, n. sp.

Blacodes cristatus, n. sp., ♀.

Wholly black, the tibiæ slightly piceous. Head light gray pollinose, that in middle of the front dark brown ; face moderately convex, mystax black and white, very dense and extending nearly to the antennæ; first joint of antennæ slightly longer than the second ; third joint lanceolate, three times as long as the second joint ; style slender, slightly over half as long as the third joint. Thorax very convex, gray pollinose and marked with a broad blackish-brown geminate median stripe, which is considerably dilated outwardly behind the middle ; on each side of this stripe is a broad, irregular, blackish-brown stripe extending but little in front of the middle of the dorsum ; the median brown stripe bears numerous black and light yellow pile, which, on the anterior portion, forms a nearly erect crest ; bristles of thorax black and light yellow ; pleura mottled light gray and dark brown pollinose, the pile white ; the fan-like row of bristles in front of the halteres is white. Scutellum brown pollinose and densely white pilose, the four marginal bristles black. Metanotum shining black, a large silvery white spot each side. Abdomen shining bluish-black, marked with light gray pollen as follows : A spot on sides of first segment, a transverse anterior and two posterior lateral

oblique spots on each remaining segment, the anterior spot obsolete on the last two segments, the posterior spots uniting with the gray lateral margin except on the second segment, each extending obliquely inward from the posterior angle of the segment and reaching at least a third of the distance across the segment, those on the sixth segment united; pile of dorsum very short, sparse, depressed, mostly light yellowish, that of the sides and venter longer and white. Pile of legs white, the bristles light yellow; front and hind tibiæ and their metatarsi densely bright yellow pubescent within; spur of front tibiæ rather slender, middle tibiæ also furnished with a strong, nearly straight black spur at the tip within. Wings pure hyaline, the extreme apex gray, a large brown cloud on veins at bases of the first and second submarginal cell, of each posterior cell and of the discal cell; all posterior and the anal cell open, second submarginal cell destitute of a stump of a vein. Halteres black. Length, 11 mm. Ventura County, Cal. A single specimen, in April.

Blacodes truncus, n. sp., ♂ ♀.

Same as *cristatus*, described above, with these exceptions: Tibiæ, extreme apex of femora, and base of each joint of the tarsi, yellow. Pollen of front light gray, mystax very sparse, white; third joint of antennæ almost linear, nearly four times as long as the second. Thorax destitute of a medium crest of pile, scutellum not densely pilose, bearing only two marginal bristles, metanotum uniformly gray pollinose, destitute of silvery spots. Pollen of abdomen, consisting of an anterior cross band on each segment, dilated each side so as to reach the posterior angle of the segment. Brown clouds on wings very faint; base of second submarginal cell furnished with a long stump of a vein. Halteres yellow. Length, 9 mm. Los Angeles County, Cal. Two males and two females.

Blacodes clausus, n. sp., ♂ ♀.

Differs from *truncus* only as follows: In the female the pollen on the abomen is much more extended, covering nearly the entire dorsum, but in the male it is confined to the anterior end and sides of each segment, that on the sides being greatly dilated inward at the posterior corner of each segment. Base of second submarginal cell destitute of a stump of a vein; anal cell closed and short petiolate; brown clouds of wings obsolete or wanting. Length, 7 to 9 mm. Orange County, Cal. Three males and six females.

NOTES ON SOME INJURIOUS INSECTS OF TEXAS.

BY F. M. WEBSTER, WOOSTER, OHIO.

The following fragmentary contributions to a knowledge of a few of the destructive insects of this most interesting State are given here, not so much on account of their present individual value, as for the purpose of drawing attention to the riches in store for the entomological worker who may drift within its borders. In new countries travellers, in passing through, blaze or bark a tree here and there along the way to guide those who may follow after. These notes may be but blazes, but if they prove of aid to others in the future, they will have served their mission. The major portion of the material for this notice has been sent me from time to time by my friend, Prof. Geo. W. Curtis, of the A. & M. College, while others have been received from various other correspondents. To these I have occasionally added some of my own observations, when they seemed to augment the value of those made by others.

Early in May I received a number of twigs of Fig, in which were burrowing numerous larvæ and adult beetles. Of these last there were *Amphicerus bicaudatus*, Say, *Trogoxylon parallelopipedum*, Mels., and a single *Sinoxylon basilare*, Say. The *Trogoxylon* have continued to appear throughout the summer up to date (Sept. 29), while one of the larvæ of *Sinoxylon* has only transformed to an adult within the last few days. As I saw adults on Mesquite, burrowing into the wood, in Llano County, in March,* it would appear that their season of appearance is somewhat protracted, especially as I have since reared them from this same lot of Fig twigs in May, June, August and September.

In April, specimens of *Blapstinus auripilis*, Horn, were sent me from the vicinity of Galveston, where they were said to be destroying watermelon vines, the beetles being found in great numbers on the ground beneath the vines, while the plants withered and died. The beetles were alive when received, and, having no melon vines, I placed them on cucumber, which they refused, but ate the young plants of *Polygonum* which were growing among them. The accusation in regard to the destruction of melons, however, will need to be sustained by further observation, as they might have died from some bacterial or other disease, the beetles, though present, having nothing to do with the disease.

Chinch bugs, *Blissus leucopterus*, Say, were reported abundant in the central southern portion of the State in April, but I have no information

*Insect Life 3, 454.

of any serious depredations later in the season. An attack on Alfalfa was reported, but, unfortunately, the cause of the trouble was lost in transit, and I can only suspect, from the nature of its work, that it was some species of lepidoptera, probably a Pyralid, though I hardly think it could be *Eurycreon rantalis*. The method of attack on Alfalfa resembles that of the Parsnip web-worm, *Depressaria heracliana*, De G., on parsnip, in that the terminal leaves and stems of the plant are drawn together and held by a web, and within the enclosure thus formed the caterpillar evidently lives, feeding from the tender growth, thereby dwarfing the plants. Prof. Townsend, of Las Cruces, New Mexico, writes me of reports of similar injury in that section of the country, but he has not yet been able to secure specimens of the depredator.

Considerable injury to the Pecan was reported, and specimens of the depredator were sent with samples of the injured Pecans. But, again, the pests escaped, probably to the mail sack, that bourne from which no entomologist's treasures ever return. The worms were reported as causing the shuck enveloping the nut to mould and drop off the tree before they were full grown, thereby rendering them valueless. In Insect Life, vol. 4, p. 78, mention is made of a probably undescribed species of Phycitid, whose larvæ are said to attack the buds of Pecan in early spring. These were sent from the vicinity of Brownwood, Texas, June 17, while the specimens intended for me were collected with the injured nuts, September 14. Whether or not there is any connection between the two remains to be learned.

The Angoumois Grain Moth, *Sitotroga (Gelechia) cerealella*, Oliv., is an every year pest, both in the field and among stored grain. My old experiments, with heat, made ten years ago, and before the use of carbon bisulphide came into application in destroying grain infesting insects, are less practical than is the use of this fluid drug. The same measure may be used against the Rice Weevil, *Calandria oryzæ*, which appears to be especially abundant among stored corn, and is, so far as my correspondence and personal observation goes, the grain weevil of Texas.

The Bag Worm or Basket Worm appears to be exceedingly numerous the present season in various portions of the State, and the same may be said of Southern Ohio. Of five sent me from Texas, August 11, and placed on trees in my yard, four soon clustered together and spun their fastenings to the same twig, while the fifth amused me by wandering about in a dissatisfied sort of way, and finally going off by itself to an adjacent limb, to which it immediately attached itself permanently.

THE LARVÆ OF THE CLISIOCAMPÆ.

BY HARRISON G DYAR, ROXBURY, MASS.

As has been shown by Mr. R H. Stretch, the North American species of Clisiocampa are best separated by larval characters, and this paper will deal chiefly with them. I refer to Mr. Stretch's paper in volume I. of Papilio, which contains about all that has been known regarding the species.

There are two pretty well defined groups. The first contains *C. disstria*, *C. erosa* and *C. thoracica*, and the second the remaining species. The first are not nest-spinning species; the larvæ rest in bunches on the trunk without covering. The second, with the possible exception of *C. constricta*, of which I have seen no nest, and of *C. incurva*, the larva of which is unknown, are all nest-spinning. Their webs are formed in forks of the smaller branches or twigs, as in the well-known *C. americana* of the Atlantic States. The Eastern region, from the eastern slope of the Rockies to the Atlantic, has two species, one belonging to each group, namely, *disstria* and *americana*. The Pacific Northwest, from the Cascade Mountains to the Pacific, has also two, one to each group, viz., *erosa* and *pluvialis;* but the latter, which takes the place of *americana*, is not its representative, as *erosa* is of *disstria*. The central arid region has but one species at present known to me, unless *incurva*, described from Arizona, be found throughout the range of *fragilis*. *C. fragilis* is the only species not a tree feeder, and this habit has evidently been induced by the absence of deciduous trees in its habitat. California has four species, all endemic, unless it be that *thoracica* is the same as *erosa* of Oregon. Prof. Rivers's description recalls *erosa* most vividly, but he makes no mention of the broad subdorsal blue band so distinct in the larva of *erosa*.

§1. Group *disstria*.

CLISIOCAMPA DISSTRIA, Hübner.

1797—Smith & Abbot, Lep. Ins.,Ga., n. 117, tab. LIX. (as *P. neustria.*)
1816—Hübner, Verz. Bck. Schm., p. 192, No. 1975.
1889—Hy. Edw., Bull. 35, U. S. N. M. (26 references).

sylvatica, Harris.

1841—Harris, R. Ins., 271.

drupacearum, Boisduval.

1869—Boisd., Ann. Ent. Soc. Belg., xii., 82.

Larva.—Black, with ten elliptical white spots on the back, one on each segment, except at the extremities ; a sub-dorsal reddish line ; lateral area largely blue gray, becoming paler below.

Food-plants.—Various forest trees, witch-hazel (Hamamelis), etc.

Habitat.—The Eastern region, from the Mississippi valley to the Atlantic.

[The above description is from notes made several years ago, and is not sufficiently full.]

CLISIOCAMPA EROSA, Stretch.

1881—Stretch, Papilio, i., 67.

1883—Stretch, Papilio, iii., 20 (as larva No. ii.)

Larva.—Head bluish-gray, with small black spots ; hairy ; labrum whitish. Body black, a row of white or orange-tinted dorsal spots, two on each segment, rounded, the posterior one the smaller. In the dorsal space are several supplementary, narrow, orange-red lines, sometimes partly filled in with blue. An orange-red subdorsal line narrowly separated by a black line from a broad blue band, minutely black dotted ; a narrow black line ; a lateral orange-yellow line; below this blue-gray, with traces of a broken yellowish substigmatal line and one along the bases of the legs. Hair, thin dorsally, faintly reddish ; short and dense from the subventral region, silky white with some dusky and reddish hairs intermixed. On joints 3, 4 and 12 the blue subdorsal band is broken by a quadrate black patch, and incised on the other segments.

Food-plants.—Oak, alder, poplar, willow and fruit trees.

Habitat.—The Pacific Northwest.

CLISIOCAMPA THORACICA, Stretch.

1881.—Stretch, Papilio, i., 68.

1889—Rivers, Proc. Cal. Acad. Sci., ser. ii., vol. i., 105.

Larva.—Prof. J. J. Rivers says:—"Body obscure brown ; dorsal ridge ornamented with a row of conspicuous ochre coloured spots, two spots on each segment, the one placed in front always much the larger; the spots are attended by numerous short waving lines of reddish brown, running longitudinally, and there is a subdorsal line of the same colour and a spiracular line of a much lighter shade. Its whole length, above the feet, is occupied with numerous tufts of grayish hairs."

Food-plants.—Willow and fruit trees.

Habitat.—San Mateo Co., (Stretch); Berkeley, Cal. (Rivers). If Prof. Rivers's determination of the moth is correct, and I see no reason to doubt it, then the name may have to fall as a synonym of *C. erosa;* for the larva is so much the same that there does not seem to be anything in the description to separate it by, unless the subdorsal blue band be really absent.

§2. Group *americana.*

CLISIOCAMPA AMERICANA, Harris.

1797—Smith & Abbot, Lep. Ins., Ga., n. 119, tab. LX. (as *P castrensis.)*

1841—Harris, Cat Ins., Mass., 72.

1889—Hy. Edwards, Bull. 35, U. S. Nat. Mus., 77. (32 references.

decipiens, Walker.

1855—Walk., Cat. Brit. Mus., vi., 1488.

frutetorum, Boisduval.

1869—Boisd., Ann. Ent. Soc., Belg., xii., 82.

Larva.—Head black, pilose, a few long black hairs ; bases of antennæ and labrum white. Body black with a narrow white dorsal line on joints 3-12, fainter posteriorly and speckled with black. An orange coloured subdorsal band, rather irregular and a little mottled with black. Below this a subdorsal row of blue dots, two on each segment, elongate, the anterior one longitudinal, the posterior transverse. Above and below them is an interrupted orange-tinted line, and below this the lateral area is mottled with pale blue, becoming brownish in the subventral space. Hair reddish brown, most abundant subventrally.

Food-plants.—Wild cherry and fruit trees.

Habitat.—Florida to Canada : west to the Mississippi Valley.

CLISIOCAMPA CONSTRICTA, Stretch.

1874—Hy. Edwards, Proc. Cal. Acad. Sci., v., 368.

1881—Stretch, Papilio, i., 66.

strigosa, Stretch.

1881—Stretch, Papilio, i., 67.

1892—Dyar, Psyche, vi., 326, *pr. syn.*

Larva.—Head powdery blue, with black mottlings ; mouth black, lower part of clypeus white ; antennæ white ringed. Body black, densely

covered with powdery blue over the whole lateral region up to and including the subdorsal blue dots, and leaving only a few black mottlings and a subquadrate black patch on each segment laterally, bordered below by an orange dash. Below the spiracles, the blue becomes nearly white, and anteriorly on the segments tufts of silky white hair grow from the skin. Traces of a subventral orange shade. Dorsum black without a dorsal line, the usual pair of orange subdorsal lines narrow and irregular, heavier at the posterior part of each segment. Considerable conspicuous orange tinted hair grows on the back.

Food-plant.—Oak *(Quercus Kelloggii).*

Habitat.—The more hilly parts of California.

CLISIOCAMPA AMBISIMILIS, *nov. sp.*

Larva.—Head pale blue, with numerous black spots especially at the vertex ; labrum and basal joints of antennæ yellowish-white ; many white hairs. Body black, largely mottled with pale blue-gray at the sides and a series of subdorsal blue dots, two on each segment, the posterior one of which is produced downward into a transverse dash reaching the lateral blue region. A dorsal bluish-white line, much broken, but irregularly so ; in some specimens it is continuous from joint 3 posteriorly, in others widely broken in the segmental incisures or entirely absent. A subdorsal series of waved, broken, orange lines, triple or quadruple on the posterior part of each segment, single anteriorly. A paler broken lateral line just above the blue area. Hair quite dense, keeled slightly dorsally and tufted laterally, red on the back, but silky white on the sides, as in *C. constricta.*

Food-plants.—Fruit trees.

Habitat.—Santa Cruz Co., California.

This species occurred to me abundantly on fruit trees at Watsonville, Cal., but the native food-plant was not determined. The larvæ are closely related to *C. constricta*, differing in the presence of the dorsal line (though this is not constant) and in the greater restriction of the lateral blue area, which does not extend up to and enclose the subdorsal dots, as it does in *C. constricta.* The moths are very different. The ♂ is rusty brown, with two pale lines, the ♀ pale brown, with two darker lines. My specimens are too poor to enable me to give characters to separate the moths from *C. californica*, which they much resemble ; but the larvæ are abundantly distinct. Besides the marked difference in markings, the contrast in the colour of the lateral hairs of the two species is striking. Dr. Packard has

probably confounded this species, as well as *C. fragilis*, with *C. californica* in the 5th report of the U. S. entomological commission.

CLISIOCAMPA CALIFORNICA, Packard.

1864—Packard, Proc. Ent. Soc. Phil., iii., 387.

1877—Packard, Inj. Ins. West, 807.

1881—Stretch, Papilio, i., 64.

1890—Packard, 5th Rept. U. S. Ent. Com., 120.

pseudoneustria Boisduval.

1869—Boisd., Ann. Ent. Soc. Belg., xii., 82.

Larva.—Head black, very hairy except where the ocelli are, sometimes tinged with powdery blue in front; labrum whitish. Body entirely black, except the tips of the abdominal feet, which are pale, covered with long, fulvous hair, quite thick, especially dorsally, where it is keeled, and laterally, where it is tufted anteriorly on the segments. Almost entirely without marks; some have an irregular red subdorsal line, interrupted between the segments and narrowly centrally on each segment, mottled with the ground colour; while all have a series of subdorsal small blue dots below the red line, only one on each segment, and sometimes a lateral series of red dashes. In some even the blue dots are obscure and wanting on the central segments.

Food-plants.—Oaks (*Quercus agrifolia* and *Q. lobata*).

Habitat.—The coast region of California.

Dr. Packard has confounded *C. fragilis* with this species, if not others also, and consequently gives it a habitat much too extended. *C. fragilis* is abundantly distinct from *C. californica* in the larva, and, though the ♂ moth is very similar, the ♀ shows good specific differences.

CLISIOCAMPA FRAGILIS, Stretch.

1881—Stretch, Papilio, i., 64.

1888—Hy. Edw., Ent. Amer., iv., 62.

1890—Packard, 5th Rept. U. S. Ent. Com., 120 (as *C. californica.*)

Larva.—Head blue gray, dotted with black, mouth and ends of antennæ black, labrum and bases of antennæ sordid white. Body with the ground colour black, a broad pale blue dorsal band, broken at the segmental incisures and narrowed a little at both ends of each segment, absent on joints 2 and 13. Orange subdorsal marks much reduced, scarcely noticeable, consisting of from one to three narrowly linear, waved and broken streaks. Subdorsal blue dots, two on each segment, very large, subquadrate, either separate or confluent on their upper sides,

or also confluent with the lateral blue-gray area, but always leaving a row of black patches, one in the middle of each segment. A faint, lateral, pale orange or whitish line, broken and bordering the black patches below. Below this line to the legs, blue-gray, mottled with black, with traces of a whitish substigmatal line and one along the bases of the legs. Venter black, immaculate. Thoracic feet black, the abdominal ones pinkish at tips. Hair moderately abundant, faintly reddish tinged on the back, white on the sides, but rather thin and not tufted.

Food-plants.—Wild gooseberry (Ribes) and rose (Rosa.)

Habitat.—Nevada, Montana, Wyoming, Colorado, and probably all the arid region from the eastern slope of the Rockies to the Sierra Nevada and Cascade Mountains.

CLISIOCAMPA PLUVIALIS, *nov. sp.*

1883—Stretch, Papilio, iii, 20 (as larva No. 1).

Larva.—Head hairy, bluish-gray, spotted with black, the spots segregating on the vertex, or covering nearly the whole head; labrum and bases of antennæ yellowish white. Body black, a pale blue dorsal line, divided between the segments, obsolete at the extremities, and forming 9 rather narrow, elongate, blue spots tapering at their ends, exactly as in *C. fragilis.* A subdorsal row of blue dots, two on each segment, the anterior one the smaller, and not reaching quite so far down. Between these is an orange band, starting in a small spot on the anterior part of each segment and either broken or connected with a broad triangular widening of the band on the posterior part. A distinct, broad, but rather irregular, pale orange, lateral band, narrowly broken here and there, and containing a few black dots. Below this, a slight suffusion of blue, mottled with black, and a diffuse and mottled pale orange substigmatal band, besides another along the bases of the legs. Below, black, with a double diffuse and mottled bluish band, or the venter all mottled with bluish white. The subdorsal orange band is very conspicuous. It may extend from near the dorsal line to below and behind the subdorsal blue spots and also in front of them, but is usually less on the anterior part of the segments and always retracted centrally. Its dorsal edge is well defined, a little curved on each segment, following the outline of the pieces of the dorsal band, but always separated from them by a black space, though it sometimes nearly surrounds them by connecting over the dorsum with the band on the other side, posteriorly on the segments. In some examples the region below the subdorsal band to the venter is largely overspread

with orange, mottled with the ground color, most heavily just below the subdorsal band. Hair not thick, reddish, both on the back and sides.

Food-plants.—Alder *(Alnus)*, apple, etc.

Habitat.—The Pacific Northwest, from the Cascade range to the sea. Found abundantly at Seattle, Washington, and rarely at Portland, Oregon.

The moths do not differ from Stretch's description of *C. fragilis*, except that in the ♀ there is no broad, brown band on the forewings, but a diffuse shade outward from the inner dark line ; in some specimens also bordering the undulated pale outer line. A larger series of specimens than I possess will probably show further differences, though the species is closely related to *C. fragilis*.

CLISIOCAMPA INCURVA, Hy. Edwards.

1882—Hy. Edw., Papilio, ii., 125.

The larva of this species is unknown. I have examined the moths in the collection of Mr. B. Neumoegen, and they seem closely allied to *C. fragilis*. They differ from any other species of this group in that both sexes are pale. The male is suffused with brown on the forewings, the lines pale, bordered inside with brown, so that in pale specimens the lines look brown. The female is the same, but browner, so that the lines are always pale, the outer waved, the inner sometimes rather faint, so that its brown edge is the more distinct. In both, the brown is deeper between the lines than outside them. I am not inclined to give much weight to the character from which the species was named. *Clisiocampa*, like *Datana*, cannot be separated by the position or shape of lines, but by the difference in the relative coloration of similar markings. In *Clisiocampa*, both sexes are needed for a determination. The following table will separate the larvæ here described. *C. incurva*, only, is unknown.

§1. A dorsal row of rounded spots.
One spot on each segment, - - - *disstria*, Hbn.
Two spots on each segment.
A broad, distinct, subdorsal blue band, - *erosa*, Str.
No distinct subdorsal band? - - *thoracica*, Str.

§2. A dorsal line, continuous, broken or absent.
A continuous, narrow white line, - *americana*, Harr.
Dorsal line, if present, not white ; often absent.
Line irregularly broken or absent.
Lateral region heavily blue shaded.

Blue inclosing the subdorsal dots, *constricta*, Str.
Blue not reaching the dots, *ambisimilis*, Dyar.
Lateral region with no blue shade, *californica*, Pack.
Line forming a row of elliptical blue spots.
A slight subdorsal orange band, - *fragilis*, Str.
A heavy orange band, - - *pluvialis*, Dyar.

ASTATUS BICOLOR, SAY.

BY WILLIAM J. FOX, PHILADELPHIA.

In reply to Mr. Charles A. Hart, who has shown, in the last number of this journal, that in his opinion I am in error regarding the identification of *Astatus bicolor*, Say, I would say that the stigma of the ♂ only is "yellowish-rufous", while that of the ♀ varies from reddish-black to deep black. If he will again consult my synopsis of the genus Astatus he will find that I used the words "stigma of wings black" in separating those of the female sex. In regard to my new species, *A. pygidialis*, which Mr. Hart suggests may be an extreme variety of *bicolor*, it differs not only in the slight characters mentioned by him, but also in the shorter and triangular pygidium, and the more feeble armature of the legs; the scutellum is not furrowed down the middle, and the insect itself is much smaller. Although it *might* prove to be but a variety of *bicolor*, nevertheless a series of nineteen specimens of that species and three of *pygidialis* show no intergradation, and therefore I think I was justified in describing it as new. I would rearrange the synonymy suggested by Mr. Hart as follows:

ASTATUS BICOLOR, Say.

A. bicolor, Say. Lec. Edition, I., p. 166, ♀ ♂.
A. rufiventris, Cress. Tr. Am. Ent. Soc., IV., p. 218, ♀.
A. terminata, Cress. ibid., p. 218, ♂.

A. PYGIDIALIS, Fox.

A. pygidialis, Fox. CAN. ENT., XXIV., p. 234, ♀.
A. bicolor, Hart, (not Say). ibid., XXV., p. 27.

NOTE UPON THE REVISION OF THE GENUS CUCULLIA.

BY AUG. R. GROTE, A. M., BREMEN, GERMANY.

The "Revision of the Genus Cucullia," by Prof. Smith, in Proc. U. S. Nat. Mus., XV., pp. 33, *et. seq.*, raises the number of described North American species to 14, and is an interesting addition to the knowledge of our *Noctuidæ*. Larger collections from the west have come to hand since my study of the species and have admitted of fuller comparisons. Although the species of *Cucullia* are not among the commonest Owlet Moths and seem to fall less easily a prey to the collector's efforts than those of many other genera, still we may conclude that the above figures give, at least approximately, the N. American representation of the genus. In a comparison of the faunæ of Europe and North America* I have sought one distinction in the smaller representation of the Hooded Owlets in America. Whereas in other leading genera, such as *Apatela (Acronycta)*, *Hadena*, *Mamestra*, *Agrotis*, *Oncocnemis*, *Lithophane*, *Plusia*, *Catocala*, the North American species are much the more numerous; in *Cucullia* the proportion is reversed, and we have only 14 American to 43 European species of the genus. Of a truth we seem to have only 12 species which represent structurally the European forms. Two of our species *(bistriga* and *serraticornis)* I have no doubt (from figures and descriptions, as well as my own observations upon the Californian form) will come to be separated generically, or at least subgenerically, from the rest. There appear to be no analogues to these two species in the European fauna.

It is noteworthy that our North American species belong, in the main, to the groups represented in Europe by *Blattariæ*, *Asteris* and *umbratica*. No North American representative of the group of *Scopariæ* appears to be known, and, in particular, the silvery group containing *argentea* is wanting with us. Our western plains have this in common with the Russian steppes that they produce *Heliothini* in abundance, and when the description of *Cucullia luna*, Morrison, appeared, I was induced to believe that we had also found an American silvery species of *Cucullia*, allied to *argentina* from Astrachan or *splendida* from the Ural and Altai. But it now appears that this species of Mr. Morrison's is my *Epinyctis notatella*, a genus referred by me originally to the white Heliothians, among such forms as *Pippona* and *Antaplaga*, and where, from its structure, I believe still it most naturally belongs. At nearly the same time the moth was

*See Grote: "Die Verwandtschaft," etc., Verh. Gesell. Deutsch. Naturf., 2tei Theil, pp. 148-154, Leipzig 1890.

published by Prof. Smith as a new genus, but "closely allied to *Cucullia*," under the name of *Nyctophœata*. These facts, which are of interest in a comparison of opinions upon one and the same Noctuid, are obscured by Prof. Smith's brief statement that "the species described as *luna* by Mr. Morrison is an Heliothid", l. c. p. 37. According to Smith, Bull. Br. Ent. Soc. 45, it "should stand between *Cleophana* and *Cucullia*".

If, then, we really possess a silvery *Cucullia*, it has yet to be discovered. Such a form must be looked for in the west, in the States and Territories adjoining the Rocky Mountains, and, probably, on the eastern side of the range. But not improbably such forms, so much prized by European collectors, are entirely wanting in our fauna; while, although breeding and more extended research may turn up new species, it may be concluded that we shall finally remain much behind Europe in the total number of our native species of *Cucullia*. This fact is important in a study of geographical distribution. We know too little as yet to generalize upon its probable cause. The species of *Cucullia* run often closely together and are also confined, it would sometimes appear, to single kinds of food plants. I content myself here with calling attention to the circumstance. Upon the following species I would make some notes in reference to Prof. Smith's remarks:—

Cucullia convexipennis, G. & R.

No mention, or I have overlooked it, is made in the Revision of the somewhat peculiar shape of the wings, to which this species owes its specific name. I should have been glad had I been able to note that our observations in this respect had been verified. On the whole, this seems our most striking species yet discovered.

Cucullia florea, Guen.

The specimen of this species, referred to on page 45 of the Revision as "from Dr. Lintner", was given by me, with the above determination, to Dr. Lintner when he was studying that genus, as also the types of *serraticornis*. This unique specimen, which I had determined as *florea*, agreed fairly with Guenée's figure and description, and Dr. Lintner had not recognized the species elsewhere when I gave it to him from my collection. The specimen was, I believe, from New York State, but I had lost the exact locality. I believed that I had collected it myself at a time when my attention was not especially directed to the genus. Afterwards, finding the specimen in my duplicate boxes, I determined the same with-

out being certain of its origin. This species, from its grayer colour, is readily distinguished from *postera* or *asteroides* (*i. e. star-like?*, a queer title for the moth; the Latin name was probably meant to refer to the European *Asteris* or to the botanical genus *Aster*, a food plant for some of the species) and must be quite uncommon. I never saw a second example.

Cucullia lætifica, Lint., in Grote Check List (1875).

In describing the type of *cita*, from Arizona, I had no longer specimens of *lætifica*, from Texas, for comparison. The discovery of *montanæ*, Grote, had led me to expect new western forms of the genus, and in the present instance the sexual difference in general colour assisted my mistake. I have no doubt that the reference in the Revision is correct, and that the Texan species extends its range to Arizona. I do not know Prof. French's species, also referred here. With regard to *Cucullia solidaginis*, Behr., in Strecker, if my memory serves, I had a note upon it to the effect that it did not belong to this genus. If so, we have as yet no typical species of *Cucullia* known from California or west of the Rocky Mountain range. I must concur with Mr. Smith's remarks upon the descriptions of Behr. in Strecker.

In my opinion the *Cucullini* form a tribe of the *Noctuinæ*, sufficiently characterized by comparative characters. These consist in the elongate wings, the tapering abdomen, the fine and smooth vestiture, the hooded collar, the pencilled anal tuft, the short and unarmed legs, naked and lashed eyes. The European species have, in the group of *Scrophulariæ*, the fringes of primaries dentate. The rest, with the American forms, seem to have them even. The usually smooth larvæ are very distinctly marked, but are not easily distinguished upon the food-plant. In habit and character they resemble *Heliothis* somewhat. The flower of a purple double aster I had here, blooming in a pot on my window-sill, contained the coiled and partially hidden full-grown larva of one of the European species, which I did not discover for some days. The pupation is effected in the ground in a dense cocoon mixed with earth, the moth appearing in the spring. The larvæ, when disturbed, often make a jerking motion, reminding me of that of the Hawk Moth, *Thyreus Abbotii*. It must indeed be said that the moths are not without some resemblance to the *Chærocampinæ*.

In my Revised Check List of 1890, I have given eleven species of *Cucullia*. The list must now be changed to include the following fourteen apparently valid names :

1. convexipennis, *G. & R.*
2. montanæ, *Grote.*
3. similaris, *Smith.*
4. obscurior, *Smith.*
5. asteroides, *Guen.*
6. postera, *Guen.*
7. florea, *Guen.*
8. lætifica, *Lintn.*
9. Speyeri, *Lintn.*
10. dorsalis, *Smith.*
11. intermedia, *Speyer.*
12. cinderella, *Smith.*
13. bistriga, *Smith.*
14. serraticornis, *Lintn.*

A TRYPETID BRED FROM GALLS ON BIGELOVIA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

A round, white, woolly gall was found on stems of Bigelovia (sp. probably *graveolens*) in several localities in western New Mexico the past summer, from June 19 to 22. Those found June 19 were old galls, and were met with near Luera Spring, in Socorro county. On June 21 the fresh galls were found in numbers near Gallo Spring. Sometimes two or three were found near each other on the same stem or twig of the plant, and in one case three galls were found joined together, forming a triple gall. On June 22 they were found extremely common west of Apache Spring, thus seeming to increase in number in a westerly direction, as did also the patches of Bigelovia, every plant of which was full of them. The last two localities are on the Pacific slope of the Continental Divide, the first locality (Luera Spr.) being to the east of the divide about 40 miles.

Many of the galls found June 22 were opened at the time and disclosed several hymenopterous pupæ which were at first taken for the gall-maker. Some also contained a small white larva, probably belonging to the hymenopteron. Most of the galls, however, contained puparia which were taken for those of a tachinid, but which were in reality the puparia of a trypetid and the original gall-maker. None of the puparia were noticed to contain the fly, and numerous galls that were picked and kept in pill boxes for several months developed no trypetids. It was later found, however, that two of the puparia extracted from the galls at this date and placed in alcohol contained the pupa within. The credit for the breeding of the fly is due to Professor C. P. Gillette, who sent me speci-

mens of the fly and gall. Several flies were bred by him from galls which he collected at Dolores, Colo., June 18, the flies issuing June 19. The following is a description of the gall made by Professor Gillette at the time :—

Galls sub-globular in form, varying from ¼ to ½ inch in diameter, and borne singly along the side of the stems of Bigelovia. They are very light in colour, being densely covered with a short white woolly hair. Beneath this fuzz the substance of the gall is greenish in colour and quite brittle. At the centre of each gall is a single larval cell containing, at this date, the puparium of some fly. From the larval cell a burrow leads to the woolly outer covering, which it never penetrates, and it cannot be seen from the outside. The galls are very common.

I have little to add to this description. The galls which I collected measure (dried) from 8 to 11 mm. in diameter, the average being about 9 mm. The wool is extremely fine in texture. As before stated, they were often approximated to each other on the same stem. Their form seems to indicate more or less plainly a bud-like growth, and they very often show the opening of the larval burrow on the outside.

I have referred this trypetid to the sub-genus *Eurosta*, Loew, because it seems to come nearest to this group of species, though it does not entirely fit the characterization. The fifth vein is not bristly, scutellum has only two bristles ; the front is what I should call very broad, perhaps not "remarkably" so ; the third antennal joint is short, but the ovipositor seems to be somewhat flattened instead of conical. The following is a description of the species :—

Eurosta (Trypeta) *bigeloviæ*, n. sp. ♀.

Wings do not resemble any figured by Loew in monographs ; they are very pale at base, rest blackish fuscous, except the white reticulations, and a slightly flavous portion near centre, and a little approximated to costa, being situated in basal portion of submarginal, distal portion of first basal and proximal portion of apical cells ; a white spot on costal margin before and just reaching the costal spine, before this an elongate transverse white spot extending from costa back to posterior (second) basal cell, and bordering on the pale basal portion of wing ; on costa in marginal cell two white spots, the inner one just beyond and at extremity of first longitudinal vein, the outer one more elongate transversely and

extending nearly across submarginal cell, the inner one wholly in marginal cell; marginal cell more or less pale, at least on costal portion; submarginal cell with a longitudinally elongate, slightly cresentic pale area in its apical portion; an elliptical, longitudinal white spot in first (anterior) basal cell at its distal two-thirds just the width of cell; a round white spot nearly in middle of widened distal portion of discal cell, a little approximated to anterior border of cell; a transversely oblique, somewhat elongated white spot in apical cell on its distal two-thirds, but little separated at its posterior end from a similar spot in distal portion of second posterior cell, which, however, reaches hind margin, where it slightly widens, these two spots having the same oblique direction pointing outward toward the hind margin of the wing; a large inverted V-shaped white spot nearly in middle of second posterior cell, a little nearer base, slightly bulged on its inner (toward base of wing) margin, and its prongs reaching hind border of wing; two smaller, quite widely separated white spots bordering on hind margin in distal portion of third posterior cell, the outer one touching fifth longitudinal vein near its extremity; a large, white spot a little before middle of third posterior cell, extending from anterior border of cell back through fourth posterior cell to hind margin of wing; a small, rather triangular white spot in extreme basal portion of third posterior cell and nearly behind the elongate marking above referred to as bordering on the pale basal portion of the wing; anal angle broadly white, extending into the anal cell, and joining the pale basal portion; wing veins at base, including the costal vein where it borders the white spots, pale yellowish; halteres pale yellowish.

Head, including front, frontal bristles, face, antennæ, cheeks, proboscis, and palpi, pale yellowish, arista slightly darker apically and bare; occiput darker on upper central portion; eyes blackish (are probably green in life); second and third antennal joints of nearly equal length, palpi enlarged apically and tips reaching to tip of proboscis; front narrowed anteriorly, on vertex more than one-half width of head; front set on ocellar area; anterior portion of orbital margins and vertex with short pale yellowish bristles, including a row on each side descending obliquely inward from vertical angles, meeting in centre and forming a V, also with a pair of long, nearly erect bristles on vertical margin, and three shorter, sub-appressed, inwardly directed pairs on anterior orbital margins. Thorax blackish, dorsum and pleuræ, including scutellum, thickly set with short,

pale yellowish bristles, some long yellowish bristles on pleuræ and posterior dorsum of thorax, and a long pair arising from sides of scutellum; scutellum blackish at base, pale yellowish on margin and apex. Abdomen rufous or dark fulvous, anal segment black, ovipositor rufous. Legs entirely pale yellowish.

Length of body (incl. ovipos.), 5 mm.; of wing, nearly 4½ mm.

Described from one specimen bred by Professor C. P. Gillette from galls collected at Dolores, Colo., June 18. Issued June 19.

An imperfectly-hardened ♀, which I collected in Johnson's Basin, in Western Socorro county, N. M., June 23, differs in the lighter abdomen, rufous anal segment; the more grayish short bristles of thorax, and darker long bristles of thorax and scutellum; in the oblique white marking of apical cell being united with the distal one of second posterior cell; and by the large inverted V-shaped marking of second posterior cell being represented by an oblique elongate marking parallel to the preceding, and a short marking inside it, both bordering on the hind margin of wing. It will need more material to establish the distinctness of this specimen.

Puparium of *E. bigeloviæ*, containing pupa: Length, 4 mm.; greatest width, 2¼ to 2 2-5 mm. Stouter posteriorly, rufous on posterior portion and brownish anteriorly, eyes and wings of pupa showing beneath puparium as black spots. Puparium showing twelve segments, counting anal and capital plates. Mouth parts of larva showing in centre of capital plate at anterior end of puparium as a very small, central, raised circle, with usually eight primary radiating ridges, their length less than twice the diameter of the circle, these ridges longitudinally and often deeply fluted, giving appearance of smaller, more numerous ridges; a pair of circles exactly similar to the central circle placed on outer margin of the area of radiating ridges, a little dorsally of the central one, and with it forming the three corners of a triangle; from the central circle there extends ventrally a linear, elongate, forked black body seen beneath the integument of the puparium. Anal stigmata showing in centre of anaplate as a pair of small blackish spots, each bearing three principal black tubercles arranged in a slightly crescentic form with the convexity ventral, and a smaller black tubercle in concavity of each crescent, one or more other still smaller ones sometimes apparent; a small, depressed median

orifice slightly dorsal to the pair of stigmata, and a third less distinct median stigma considerably removed ventrally from the pair.

Described from two alcoholic puparia taken from galls collected near Apache Spring, June 22, and containing pupæ.

The hymenopterous larvæ and pupæ which I found in the galls, June 22, and which are undoubtedly those of a parasite of the trypetid, consisted of two small larvæ, and a ♂ and ♀ pupa, the latter at once distinguished by the long ovipositor curved forward over her back. This parasite seems nearly to equal its host in size.

The larvæ, in their partially curled position, measure 2½ to 3 mm. long, and fully 2 mm. wide; tapered suddenly toward head and quite so toward anal extremity; whitish, very pale dilute yellowish after immersion for some months in alcohol, mouth parts blackish.

♀ pupa, 4 mm. long, 1½ mm. wide; ovipositor curled forward over back, reaching tip of scutellum; after immersion in alcohol pale fulvous, abdomen at base and eyes blackish. Ovipositor, in its curled position, measures nearly 3 mm.

♂ pupa, 3 mm. long, scarcely 1 mm. wide; pale fulvous, eyes black.

It should also be mentioned that there was bred from the galls collected near Gallo Springs, June 21, a very small weevil less than 3 mm. in length, perhaps an inquiline in the galls. The galls were left attached to very short pieces of the stems, but it is not likely that the weevil came from the stems, which are very small. Moreover a careful examination of the stems with a lens shows no exit hole whatever in them.

NOTE.—Since writing the above, I have found that Mr. Theo. D. A. Cockerell records, on page 106 of West American Scientist, vol. 6 (Sept., 1889), the breeding of a cecidomyiid "from woolly trypetid galls on *Bigelovia*." Mr. Cockerell has also sent me a small gall of this species, with the following note: "Gall of *Trypeta bigeloviæ*, Ckll., Ent. Mo. Mag, 1890, West Cliff, Col." I have not seen Mr. Cockerell's mention of this species in the Ent. Mo. Mag, and do not know whether he described the fly or only the gall. At all events the discovery of the trypetid nature of the gall belongs to him. When I named the trypetid as above, I did not know that the same name had been proposed for the same insect by Mr. Cockerell.

THE MEMBRACIDÆ OF ST. VINCENT ISLAND, W. I.

BY F. W. GODING, M. D., PH. D, RUTLAND, ILL.

The material forming the basis of this paper was sent to me last October by Prof. C. V. Riley for determination. The species were collected by H. H. Smith in St. Vincent, West Indies, and are among the most interesting forms of this remarkable family.

Subfamily CENTROTINÆ, Stal.

1. *Monobelus fasciatus*, Fabr.

♂. One example in National Museum.

Subfamily SMILIINÆ, Stal.

2. *Acutalis trifurcata*, n. sp.

♀. Head greenish-yellow, with an oval spot in the middle (in which are the ocelli), and a curved black line around the apex; prothorax shining greenish-yellow, a broad line ending just before the apex, at its middle sending toward the front a line, on each side, which does not reach a line through lateral angles, these lines together resembling a three-tined fork; median line behind this fork much broader; at base of median line a broad line branches from each side backward and outward in the form of an arrow-head; base of prothorax very narrowly shining black; tegmina very pale yellow, veins indistinct; chest, femora, tibiæ and tarsi dark brown. Length, 3 mm.; width, 1½ mm.

Described from one female; type in National Museum.

This species is near *Illinoiensis*, Godg.

3. *Acutalis apicalis*, n. sp.

♂. Shining black, with a submarginal yellow line on each side, originating at the apex of head it extends posteriorly nearly to apex of prothorax, where it converges towards the line on the opposite side, but they do not come together; apex bright yellow; lateral angles of prothorax produced in small tubercles; tegmina light yellow, veins darker Legs light brown, tarsi annulate with brown.

Length, 3 mm.; width, 1½ mm.

Described from one male; type in National Museum.

This species is near *flaviventris*, Leth. It may prove to be the ♂ of *trifurcata*, Godg.

Subfamily MEMBRACINÆ, Stal.

4. *Sphongophorus (Lobocladisca) vexillifera*, n. sp.

Sex (?) Dark brown fuscous; very densely and coarsely punctured. Head vertical, nearly quadrangular, a little longer than the width between

eyes ; eyes small, brown ; ocelli on a line with superior edge of eyes, to which they approach nearer than to each other. Prothorax in front convex, armed with a long, slender, nearly upright compressed horn, leaning slightly forward, seen from side, slightly sinuous and armed near middle of posterior edge with a small tooth ; seen from front, thinly compressed, and at apex bidentate, the small teeth divaricate ; behind anterior horn near middle of posterior process is a medium sized, compressed, rounded lobe, which, when seen from side, resembles the helmet of a huzzar, the top of which has a sharp, slender, needle-like spine pointing upward ; behind the base of this lobe the posterior process extends backward in a low, small, triangular process, placed vertically, with a slender spine extending posteriorly from the base. Lateral angles very prominent ; front margin arched to receive the head, the sides of prothorax extending downward in ear-shaped lobules behind the eyes. Elytra ferruginous, with a large black spot across the middle. All the tibiæ very widely dilated and thin.

Length, 6 mm ; to tip of tegmina, 7 mm.; breadth, 3½ mm.; altitude, 6 mm.

Described from one example, the sex of which could not be determined without mutilating it. Type in National Museum.

This is nearest to *rigidus*, Stal. It belongs to Stal's subgenus LOBOCLADISCA, which with its related subgenera are characterized as follows :—

Posterior prothoracic process unarmed at the middle.....Subg. SPHONGO[PHORUS, Fairm.

Posterior prothoracic process armed at or near middle with a process.

Anterior horn undate, lengthily curved backward, posterior or inferior edge unarmed..... ..... CLADONOTA, Stal.

Anterior horn substraight, not curving behind lobe of posterior process, posterior or inferior edge armed with a tooth or lobe .... LOBOCLADISCA, Stal.

5. *Sphongophorus (Cladonota) albofasciata*, n. sp.

♂. Blackish-brown, coarsely and roughly punctured, tuberculate. Head longer than wide, inferior edge 3-lobed ; ocelli on a line with superior edge of eyes, red, nearer to eyes than to each other, and near base of prothorax. Prothorax highly convex, armed anteriorly with a horn which at first extends upwards, strong and stout ; from posterior superior angle it extends, slender and thread-like, posteriorly upward and backward for another third, then it suddenly enlarges in a nearly quadrangular, com-

pressed, foliaceous lobe, having a tooth extending posteriorly; this lobe is compressed in centre with a diamond-shaped outline at the posterior edge; about the middle of the posterior process is a cylindrical upright horn, constricted on sides at middle, the upper part produced anteriorly and receives the foliole of the anterior horn which rests upon it; behind this horn the posterior process is slightly enlarged towards apex, where it is truncated diagonally downward and backward. Elytra light brown ferruginous, with a white band extending across the middle. Tibiæ all all widely dilated.

Length, 5 mm.; altitude, 3½ mm.

Described from one male. Type in National Museum.

6. Bolbonota (Tubercunota) bispinifera, n. sp.

♂. Black, covered with auriferous pubescence finely tuberculated. Head longer than wide, sides of face dilated; ocelli on a line with eyes and near base of prothorax, nearer eyes than each other. Prothorax highly convex anteriorly, behind elevated portion strongly declivous; at upper edge of declivity is a short, cylindrical spine pointing upward and backward, and between this and apex of posterior process is a larger transverse spine pointing directly upward; lateral angles produced in tubercles, above which are two little elevated lines on each side, the superior one reaching middle of inferior border of prothorax, diverging posteriorly, the surface between these and median carina smooth. Tegmina with basal portion black, remainder hyaline, veins black. Anterior pair of legs dilated, middle and posterior pairs triquetrous, with strong spines, dark brown.

Length, 1½ mm.; breadth, 1 mm.

Described from one male. Type in National Museum.

It is near *hituberculata*, Stal., and *inæqualis*, Fabr., and belongs to the subgenus TUBERCUNOTA, Godg., which with its relative may be distinguished by the following table:—

Posterior process of prothorax behind middle furnished with a high transverse tubercle or spine, more or less compressed antero-posteriorly; anterior part strongly and gradually elevated up to middle.....Subgenus TUBERCUNOTA, Godg.

Posterior process from apex, seen from side, depressed, in front of depressed part dorsum straight or lightly uni- or bi-sinuate .....Subgenus BOLBONOTA, A. & S.
(Types *melaena*, Germ., *aureo-sericea*, Stal.)

The type of the subgenus TUBERCUNOTA, Godg., is *bispinifera*, Godg., which is the smallest known member of the genus.

7. Enchophyllum (Tropidocera) Rileyi, n. sp.

♂ and ♀. Head black; prothorax beautiful orange-red, the anterior horn and a stripe passing downward from it, on each side, forks, one branch in front and one behind lateral angles, the front branch extending to eye, the hind one spreading out for a little distance along inferior border, in some examples, all the way to apex, black. Tegmina opaque brown-black, veins distinct. Legs black, front and middle tibiæ dilated, posterior tibiæ triquetrous and spined.

Length to tip of tegmina, 6 mm., including anterior horn, 10 mm.; altitude, 3 mm.

It belongs to Stal's subgenus TROPIDOCERA near *quinque-maculatum*, Fm. I take pleasure in dedicating this, the most beautiful member of the genus, to my esteemed friend, Dr. C. V. Riley, who kindly presented me with the types and who has aided in many ways my studies of this difficult group.

Types in collection of F. W. G., and National Museum.

Described from five examples.

A STATEMENT IN CORRECTION.

BY AUG. R. GROTE, A. M.

In that most useful paper, the "Directions for Collecting and Preserving Insects," by Dr. C. V. Riley, Washington, 1892, occurs the statement, on page 137, that the periodical, the North American Entomologist, was "published by the Buffalo Society of Natural Sciences." The fact is that the little monthly, which only reached its first volume, was edited by myself, and printed and published by Reinecke & Zesch, a Buffalo printing house. The material was written or collected together by myself, and the few plates, mostly contributed by the authors, were gotten up at my sole trouble, and even expense. I corrected the proofs and had sole charge of the periodical, which was intended to include short articles and reviews of current literature upon its subject. The subscriptions, advertisements and what profit resulted upon the undertaking went entirely into the pockets of the printers, who, on my suggestion, undertook the outlay for printing and paper. I received no consideration whatever for my work. The Buffalo Society had nothing, in any shape or manner, to do with the matter. My name is upon the title page and not that of the Society, nor can I find that the Society's name has been ever previously brought forward in connection with my little venture. I am entirely at a loss to account for Dr. Riley's statement, which misrepresents my entomological labours in this particular.

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CANADIAN HYMENOPTERA.—No. 3.

BY W. HAGUE HARRINGTON, OTTAWA.

In my last paper (see page 32) I unfortunately repeated the error made by Provancher in giving Vancouver as the habitat of *Ecthrus Provancheri*. I overlooked its correction (CAN. ENT., Vol. XVII, page 160) by Mr. Brodie, who obtained the insect from Muskoka.

Having recently restudied and rearranged my Ottawa collections of Phyllophaga and Xylophaga, so as to prepare for publication in the *Ottawa Naturalist* a complete list of the local species, I have made some notes which may be of more general interest. There are also several species, apparently new, which I prefer to describe here, as I think that all new species should be described (or at least redescribed) in some publication devoted entirely to Entomology, and accessible to all students. The publication of species in miscellaneous proceedings and transactions prevents many entomologists from having access to them, necessitates an outlay of money and time which in many cases cannot be spared by students, and gives rise to much unnecessary synonymy, etc.

One point of interest in the Tenthredinidæ is the excess of the females, both as regards species and individuals. Of the 152 species which have been taken in this neighborhood the females of 139 species are represented, and the males of 82 only. Both sexes are recognized in 69 species, leaving 70 represented by the female only, and 13 by the male only. This disparity of the sexes is more marked in some sections of the subfamily, notably in the unwieldy and difficult genus Nematus, where of 34 species there occur females of 32, and males of only 10., *i. e.*, only the male of every third species has been found.

The scarcity of males among sawflies is even more marked, when the occurrence of individuals is considered; for in 1,262 specimens there are 885 females and 377 males. Of many species the females and males differ so much in coloration that they have been described as distinct insects, and the relationship of some have undoubtedly not yet been recognized, but there are other species of which, while the sexes are

known and readily distinguished, it is very difficult to obtain the males either by collecting in the field or by breeding. Of such may be instanced *Nematus Erichsonii*, Hart. (= *N. cinctus*, Newm, according to Kirby), of which I have only obtained one male, although the females can be taken in any desired number.

Acordulecera saginata, Prov., is apparently the male of *A. dorsalis*, Say., a species which is found upon oak and hickory, the larvæ skeletonizing the leaves.

NEMATUS RUFOCINCTUS, n. sp. Female—Length, 8 mm. Black, with pale legs and rufous band on abdomen. Head rather small; the ocelli in shallow basins defined anteriorly by a distinct sinuate ridge above the antennæ; edge of clypeus, labrum and palpi whitish; antennæ slender, with subequal joints. Thorax polished; tegulæ, angles of prothorax and legs in great part, white; the anterior and median femora touched with brown; posterior legs with apical two-thirds of femora, apical half of tibiæ and the tarsi, black; wings large, hyaline; nervures and stigma black; third submarginal cell quadrate, small, hardly larger than first; the recurrent nervures received about one-fourth respectively from the base and tip of the second submarginal cell. Abdomen robust, with dorsal ridge; basal plates, sides of first segment, spots on fifth, and the terminal segments black, remainder rufous.

One female taken near Hull on 26th June, 1887, upon alder, and in general appearance resembling a small *N. Erichsonii*, Hart.

NEMATUS THORACICUS, n. sp. Female—Length, 6 mm. Head, metathorax and base of abdomen black, remainder rufo-testaceous. Head as wide as thorax, ridges surrounding ocelli ill-defined, but prominent between antennæ; palpi and mandibles pale, the latter with red tips; antennæ long and slender, joints subequal. Thorax rufous, except sutures below wings and the scutellar region, including the scutellum, black; legs rufous, the posterior with tips of tibiæ and the tarsi almost black; wings hyaline, nervures and stigma brownish, third submarginal cell one and one-half times as long as wide; recurrent nervures received respectively about one-fifth from base and one-sixth from apex of second submarginal cell. Abdomen short and stout, slightly ridged dorsally; basal plates and spot on first and second segments black, remainder rufous.

One female taken near the city on May 11th. This species is near *N. bivittatus*, Nort., but the head is much less rugose, and the mesothorax is not lineate with black, etc.

NEMATUS LINEATUS, n sp. Female—Length, 7 mm. Rufo-testaceous. Head nearly white below the antennæ, and honey-yellow above, palpi dusky; antennæ as long as head and thorax, rather stout, black; a black spot between ocelli. Thorax orange-yellow; tegulæ and angles of prothorax white; a line on median lobe of mesothorax, a spot above insertion of posterior wings, the apex of scutellum and adjoining sutures, black; legs yellow, coxæ and trochanters paler, tips of posterior tibiæ and tarsi dusky; wings hyaline, nervures brownish, stigma pale, third submarginal cell nearly twice as long as first, recurrent nervures received about one-fourth the distance from base and tip of second submarginal cell. Abdomen broad, compressed toward apex, paler than thorax, basal plates and narrow broken dorsal line black, ovipositor prominent.

One female collected near city on May 5th.

Fenusa varipes, St. Farg. (*melanopoda*, Cam.), previously recorded by Mr. Fletcher as introduced from Europe, was observed on Aug. 26th, upon native alders in a swamp not far from the Experimental Farm, and a number of the leaves showed the characteristic blotches caused by the larvæ. The species can, therefore, be considered as naturalized.

Emphytus multicolor, Nort., (= *Strongylogaster multicolor*, Nort., = *Emphytus hullensis*, Prov.) This is one of the species in which variability in wing-venation has led to a redescription. I have the types, ♀ ♂, of *E. hullensis*, and they agree exactly with the description of *S. multicolor*. Of six specimens which I have since collected, four have four submarginals, as in *S. multicolor*, one three submarginals, as in *E. hullensis*, and the remaining one has three cells in one wing and four in the other. As the insect seems to more nearly resemble an Emphytus than a Strongylogaster or Taxonus, I have referred it to the former genus.

Harpiphorus tarsatus, Say. From a series of specimens taken upon Cornus it seems evident that *H. varianus*, Nort., and *H. versicolor*, Nort., are only varieties of this species. My specimens vary much in colour, but even the blackest show more or less trace of rufous. The insect is very active and difficult to net, as it darts to and fro among the bushes. On one occasion I heard a rustling of insect wings on a branch near the ground and found it to be caused by two males in pursuit of a female, and I netted the three at one stroke.

Monostegia maculata, Nort. I have already (Insect Life, Vol. II., p. 227) discussed the variation in the wing-venation of our common Strawberry Sawfly, and a further examination of the species seems to indicate

that it should be placed in the genus Monostegia. It is certainly very unlike the other species of Harpiphorus. Under the name *M. ignota*, Nort., I propose to retain a few immaculate specimens which also slightly differ in other respects.

MACROPHYA ALBILABRIS, n. sp. Male—Length, 8 mm. Black; anterior legs and base of posterior pale. Head rugosely punctured, almost opaque, no depressions or sutures above antennæ; clypeus deeply emarginate, labrum truncate; both, with spot on mandibles, white; antennæ stout. Thorax coarsely punctured, the scutellum rugose; edge of tegulæ and fine line on border of prothorax white; anterior and median legs pale, including portion of coxæ, the femora and tibiæ with dusky abbreviated lines above; tips of posterior coxæ, the trochanters, basal third of femora with line below to apex, white; remainder of femora, the tibiæ and tarsi, black. Edges of basal plates white dorsally.

One male taken near the city, but not dated. This insect is closely allied to *M. flavicoxæ*, Nort., and may prove but a variety of that species, though none of my examples of *flavicoxæ* show any variation of this kind. The chief differences are in the colour of the posterior legs, the white touches on basal plates, and the more deeply emarginate clypeus.

Pachyprotasis omega, Nort.—The insect described by Provancher (CAN. ENT., Vol. XVII., p. 50.) as *Synairema americana*, seems, from his description, to be identical with this species, except that he gives the length as .46 inch, whereas my largest specimen of *omega* is only about .35 inch. Norton in his description of the species gives the length as .26 inch.

Pachyprotasis delta, Prov. Since my notes on this species (CAN. ENT., Vol. XVIII., p. 32) I sent to Mr. Kirby a small lot of Tenthredinidæ regarding which he writes: "The principal remark I have to make on this lot of insects is, that the insect sent as *Tenthredo* (?) *delta*, Prov., is a true Pachyprotasis, near *P. discolor*, Klug., an European species."

Pachyprotasis varipicta, Har. On June 7th, I captured two males which evidently belong to the species which I described as a Harpiphorus (CAN. ENT., Vol. XXI., p. 96), and these show that the species belongs to *Pachyprotasis*, and has, like *P. delta*, very unstable wing venation. One specimen has, like the female described, two cross nervures in the lanceolate cell of one wing. The other has in the right anterior wing *five* submarginals, the third cell being subdivided almost in continuation of the second recurrent. These males differ from the female only in having the

apical two-thirds of posterior femora blackish, and the basal segment of abdomen darker at the base. The outer cells of the posterior wings are closed, as in *P. delta*.

Strongylogaster soriculatus, Prov. *S. soriculatipes*, Prov., appears to have been the name under which this species was first published, but the Abbé has used *soriculatus* in republishing, and the old name does not appear in his index.

Tenthredo grandis, Nort. This species is somewhat variable in the extent of its white markings, and I have one specimen which answers exactly to the *T. nigricollis*, Kirby, described from Newfoundland.

Tenthredo basillaris, Prov. This species is placed in Cresson's catalogue as a synonym of *T. signata*, Nort. My specimens, five females, of which one was determined by Provancher, are remarkably uniform in their markings, and do not agree with the description of *T. signata*, so that I am disposed to retain the species as distinct.

Tenthredopsis Evansii, Har. I have a female of this species from the Rocky Mts. near Calgary, and have examined another from Colorado (Gillette.) This insect is very near, perhaps identical with, *Tenthredo viridescens*, Fourcr. (*scalaris*, Klug.) an European species.

TENTHREDOPSIS (?) ANNULICORNIS, n. sp. Female—Length, 10 mm. Head black, rugosely punctured; mandibles, clypeus and triangular spot above rufous, the clypeus strongly notched; antennæ slender, two basal joints and base of third rufous, apex of third, the fourth and terminal three black, joints five and six pure white. Thorax with the pleura coarsely punctured; rufous above with spot on each lateral lobe of mesothorax and the scutellar sutures black; legs rufous, tips of coxæ, the trochanters and posterior tarsi white, tip of posterior femora and of tibiæ black; wings hyaline, nervures blackish, base of stigma white; lanceolate cell with straight, short, cross nervures, as in Tenthredo, etc.; posterior wings without middle cells. Abdomen rufous.

Male.—Length, 9 mm. Antennæ a little stouter, testaceous, rufous toward base. Abdomen with apex blackish.

The female was taken near the city on June 6th, 1891, and the male on May 28th last. The antennæ of the male differ in colour, and in being slightly stouter, from those of the female, but in all other respects it seems to be identical. The strongly notched clypeus, and the absence of middle cells in the posterior wings, would seem to refer the female to Perineura, but the outer cells of posterior wings of the male are not

closed. These insects, except for the antennæ, look very much like small specimens of *Harpiphorus varianus*.

PAMPHILIUS RUFICEPS, n. sp. Female—Length, 15 mm. Black, with rufo-testaceous head and legs. Head very large; coarsely punctured, rufous, with a small black spot enclosing the ocelli; mandibles very large; antennæ slender, about 35-jointed, black, with three basal joints rufous, third joint more than twice as long as the fourth. Thorax coarsely punctured, the pleura quite rugosely; tegulæ, anterior angles, lateral lobes and apex of median lobe of mesothorax and scutellum, rufous; beneath black, with dull rufous spots on pleura; legs rufous, coxæ paler, tarsi dusky, the posterior almost black, anterior tibiæ with side spur. Abdomen broad, with narrow lateral margin of bright lemon-yellow.

One female, found walking on a doorstep in the city, May 31st, 1891. This species is near *P. (Lyda) brunniceps*, Cress.

PAMPHILIUS CINCTUS, n. sp. Female—Length, 11 mm. Black, with red band on abdomen. Head polished behind the ocelli, rugulose anteriorly; face flat with a ridge between antennæ, not reaching anterior margin of clypeus; clypeus broad, squarely truncate, not margined, and coarsely punctured; cheeks below the eyes, mandibles, clypeus, triangular spot at inner summit of each eye, similar spots behind on margin of occiput, and two minute dots below ocelli, white; antennæ black, long, slender, 25-jointed, third joint hardly longer than fourth. Thorax polished; tegulæ, short lines in front and beneath, a double triangular spot on middle lobe of mesothorax, scutellum and postscutellum, white; legs pale yellow, including tips of coxæ, anterior tibiæ without side spur; wings hyaline with brown nervures, third submarginal cell large. Abdomen with first segment, except a black spot on each side, and three following, rufous; apical segments black.

One female, taken near the city on June 28th. It resembles in appearance *P. rufofasciata*, Nort., but differs in shape of antennæ and clypeus and in markings.

Pamphilius fascipennis, Cress. This fine species, originally described from the White Mts., N.H., has been taken by Mr. Evans at Sudbury.

Xyela minor, Nort. In June, 1886, I captured by sweeping on the margins of a wood composed of pines, spruces, etc., a male and a female of this very interesting species, which Mr. Kirby thinks should constitute a distinct genus from the European species of Xyela. I failed to obtain the insect again until May 11th, 1891, when, in beating spruce trees, I

secured eight females. I endeavored to ascertain if the insects were ovipositing in the twigs, but they are so small and inconspicuous that it was impossible to find them without beating them from the trees. Subsequent beatings in the same locality, and careful search again last May failed to turn up any more. It seems probable, however, that the insect breeds in the young shoots of the spruce (as none could be found on adjoining trees or shrubs of other species), and some of our collectors, knowing when and where to search, may succeed in discovering if such be the case. It may also live in other conifers, as Provancher records taking the female on the buds of white pine, on which I have also taken one specimen.

Xiphydria canadensis, Prov.? In an article on *X. albicornis* ("A new foe to the maple." Rep. Ent. Soc., Ont., 1883, p. 40), I stated that some of the males had the antennæ black, as in *X. Provancheri*, Cress., and that this species and *X. canadensis* were probably only varieties of *X. albicornis*, with which may be also included probably *X. maculata*, Say. In re-studying my specimens I find a female which seems to be distinct, but which, however, does not agree with descriptions of any of the species quoted above as regards markings, although it agrees with *X. canadensis* in having the "head rugose except upon the vertex," and not wishing to create an unnecessary new name I have placed it under that. It has the following characteristics which are not given in the other descriptions:—Antennæ black, 16-jointed only, the second joint much shorter than in *albicornis*, not more than half as long as the third; no white markings above the antennæ on the front, but an almost square patch below and a small spot on each side of clypeus, adjoining a larger spot under the eye. There is also a small spot on the posterior margin of the head behind each eye, and two short lines above ocelli which are differently situated from those of *albicornis*. In that species the lines start about on a level with ocelli and stop before attaining the occipital margin, while in the specimen under consideration they start from the occipital margin and stop at some distance above ocelli. The coxæ are also uniformly rufous instead of black, or blackish, and the markings of thorax are different. The usual white spots occur on segments one to seven of abdomen, with the exception of the sixth.

Xiphydria rufiventris, Cress. This addition to the Canadian fauna has been made by Mr. Fletcher, who has a fine female example taken last year.

Tremex columba, Linn. In July, 1891, Mr. John Stewart, of this city, informed me that he had a stick of firewood containing a great many larvæ of beetles. Some days later I called on him to examine it and found that the insects had commenced to emerge, and that they were the common Horntail. The log was gnarlly rock-maple, about 10 inches in diameter, partly decayed, but still very hard, as was proved in sawing out a section, which I took home. I secured a number of larvæ and pupæ, and from the section retained numerous flies emerged, of which only one was a male. On leaving for Japan (July 22nd) I locked the block up in an old cabinet, and on my return found that several more females had appeared, and of course died during my absence. The fact of most interest concerning these is that one had endeavored to deposit in the block, and had died with the ovipositor deeply inserted.

NEW CHERNETIDÆ FROM THE UNITED STATES.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Since my last article on this group (CAN. ENT., Aug., 1891), I have obtained quite a number of forms; some of the new ones are described in this article. Two genera, new to the U. S., are recorded, both of which occur in South America. *Chelifer alius*, described by Leidy in Proc. Phil. Acad. Sci., 1877, agrees, as far as description goes, with *Chelanops oblongus*, Say, and with no other form known to me, therefore I consider it a synonym of *C. oblongus*.

CHELANOPS PALLIPES, n. sp.

Length, 3 mm. Colour: cephalothorax, dark brown; palpi, red-brown; dorsal scutæ, yellow-brown; legs, yellow-brown. General appearance of *C. acuminatus*, but the hand is not black as in that species. Structure also similar to *C. acuminatus*, differs in being furnished with clavate hairs; the trochanter does not project as much behind; the femur is more slender; the tibia is not nearly as much gibbose on the inner side; the hand less broad and shorter; the fingers much more slender, about as long as the hand.

California. A few specimens.

CHELANOPS LATUS, n. sp.

Length, 3.2 mm. Cephalothorax and palpi red-brown, the fingers black, scutæ red-brown, legs brownish-yellow. Structure similar to *C.*

acuminatus; hairs simple, the trochanter is less gibbose behind, the femur a little more slender; the tibia enlarges quite suddenly on the internal margin, but is then more parallel with the external margin than in either *C. acuminatus* or *C. pallipes;* the hand is more slender than in *C. acuminatus*, and the sides are quite nearly parallel; the fingers stout and much shorter than the hand.

East Florida. Under bark of pine trees. Common.

CHELANOPS GROSSUS, n. sp.

Length, ♀, 4.7 mm.; ♂, 3.3 mm. Similar to *C. oblongus*, Say, but very much larger. Palpi uniform dark red-brown; anterior part of cephalothorax similar but paler, beyond the suture yellowish; dorsal scutæ, yellow-brown; legs, pale. Body very long and narrow; cephalothorax shining, smooth; palpi with long simple hairs. Palpi similar to *C. oblongus;* hand longer and the sides more parallel; the tibia not so much swollen on the inner side and thus more slender.

Colorado. [Dr. C. F. Baker.] Apparently common.

OLPIUM OBSCURUM, n. sp.

Length, 2 mm. Colour in life blackish, in alcohol the cephalothorax and abdomen greenish with sides blackish, legs pale with a greenish tinge, palpi brownish-yellow with a tinge of green, hands darkest. Cephalothorax narrower in front than behind, anterior eyes about their diameter from anterior margin, posterior eyes just behind anterior ones and looking more dorsal; stylet simple; abdomen widest at about seventh segment, quite long; palpi shorter than abdomen; trochanters somewhat conical, sides convex; femur not quite as long as cephalothorax is broad at posterior margin, barely pedicellate; sides almost parallel, internal margin a little convex near base, then a little concave, external margin almost straight; tibia short, pedicellate, a little shorter than femur and broader than that joint, both sides convex; hand about as long as tibia, barely pedicellate, sides but little convex; fingers a little shorter than hand and curved.

East Florida. One specimen, swept from grass.

RONCUS, Koch.

Allied to *Chthonius*, differs in having but one eye on each side of cephalothorax. Not previously known from U. S.

RONCUS PACIFICUS, n. sp.

Length, 1.6 mm. Colour, pale whitish; mandibles and claws of palpi reddish; femora of palpi sometimes reddish; dorsal scutæ of abdomen yellowish-brown; legs with a pinkish tinge; young specimens lighter than adult ones. Mandibles large, as in *Chthonius;* cephalothorax somewhat narrower behind than in front, sides slightly curved, one large eye each side near anterior margin; palpi not as long as body; hand with fingers almost as long as cephalothorax plus mandibles; femur about as long as cephalothorax, sides about parallel; tibia almost conical, almost as wide at tip as the hand at base; hand not pedicellate, longer than tibia, sides but little convex: fingers longer than hand, about straight; legs short, hind pairs not much enlarged. Body and appendages with simple hairs.

Washington State. [Kincaid.] A few specimens.

IDEORONCUS, Balzan.

Allied to *Obisium*, but has only one eye each side of cephalothorax and the claw of mandible has a prominent stylet. Species previously known from South America.

IDEORONCUS OBSCURUS, n. sp.

Length, 3.2 mm. Colour, pale whitish; anterior part of cephalothorax with a reddish tinge, mandibles pinkish, palpi red, dorsal scutæ pale yellowish; body soft. The mandibles have a long stylet, which is divided into two parts; the cephalothorax is a little narrower in front than behind; the eyes, hardly perceptible above, are two, one each side, about its diameter from anterior margin; the cephalothorax just in front of eyes is more suddenly narrowed than elsewhere. Palpi shorter than body; trochanters almost twice as long as wide, the internal margin about straight, external margin quite suddenly but not greatly swollen; femur not quite as long as cephalothorax and broader than trochanters, pedicellate, internal margin at first convex then concave, external margin convex, slightly narrower near tip than near base; tibia shorter, pedicellate, external margin evenly convex, internal one convex, more so near base than near tip; hand as long as tibia, short pedicellate, much broader than other joints, neither margin much convex; fingers shorter than hand, slightly curved, stout. Body and appendages with simple hairs. Abdomen long, sides nearly parallel, not much broader than cephalothorax. The outlines of trochanters can be distinctly seen on the femora

of all legs. The tarsi are divided into two parts by a transverse suture; posterior pairs of legs but little larger than the anterior pairs.

Washington State. [Kincaid.] Two specimens.

CHTHONIUS SPINOSUS, n. sp.

Length, 1.7 mm. Colour, hard parts pale tinged with reddish-brown, venter of abdomen white; abdomen with a few silvery white spots. Anterior part of cephalothorax a little wider than posterior, the anterior portion bent downward and divided in the middle by a deep furrow, the mandibles bent downward; the cephalothorax, basal joints of mandibles, and segments of abdomen provided with scattered conical tubercles which bear a spine at tip. Cephalothorax and palpi finely granulated, basal joint of palpus [trochanter] short, not visible from above; femur about length of cephalothorax, sides nearly straight, tip a little larger than base, patella short, almost conical; hand once and a-half as long as patella, sides nearly straight but little swollen, the inner side the most so; fingers straight, longer than hand. Eyes a little more than their diameters apart. Abdomen twice as long as cephalothorax. Anterior legs long and slender; posterior pairs larger but hardly longer; trochanters distinct on posterior pairs.

Citrus Co., Florida. [C. M. Weed.] Quite common.

DESCRIPTIONS OF NEW BRACONIDS BRED BY PROF. A. D. HOPKINS.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

In the following pages I describe the new Braconids bred by Prof. A. D. Hopkins, of the West Virginia Agricultural Experiment Station, as recorded by him in Insect Life, Vol. IV., pages 256 to 259.

The types are in the National Museum.

Subfamily BRACONIDÆ.

BRACON, Fabr.

(1) *B. lixi*, sp. n. Bracon lixi, Ashm., MS., Ins. Life, IV., p. 257.

♀—Length, 3.5 mm.; ovipositor, 1 mm. Brownish-yellow; stemmaticum, metathorax above, first abdominal segment and an oblong median spot on second segment at base, black; sometimes the middle lobe of meso-scutum is black anteriorly; antennæ 35-jointed, brown. Head and thorax smooth, shining, the head transverse. Wings hyaline; tegulæ yellow; costa, stigma and nervures dark brown; recurrent nervure

received in the apical angle of the first submarginal cell; second abscissa of radius twice as long as first; second submarginal cell twice as wide at base as at apex. Legs pale brownish-yellow, the apex of posterior tibiæ above and the basal 3 or 4 joints of tarsi more or less dusky. Abdomen oblong oval, the first segment above and the black median spot on the second, rugulose; rest of the surface granulated or shagreened; the first segment is the longest; the second and third about equal, the suture between being distinct, crenated; the following subequal, the fourth being one-third shorter than the third.

Hab.—Morgantown, W. Va.

Bred from *Lixus scrobicollis*, living in *Ambrosia trifida*.

(2) *B. rufomarginatus*, sp. n.

♀—Length, 2 mm.; ovipositor, 0.5 mm. Polished black; orbits, a line extending from base of eye and along the clypeus, yellow; palpi black; legs black, beneath pale brownish; lateral margins of the abdomen and the venter reddish-yellow; antennæ 24-jointed, black; wings fuliginous; the second abscissa of radius one-half longer than the first; the second submarginal cell not narrowed at apex.

Hab.—Morgantown, W. Va.

Comes nearest to *B. phycidis Riley*, but with darker wings and different coloured legs.

Subfamily EXOTHECINÆ.

RHYSIPOLIS, Forster.

(3) ♀ *R. biformis*, sp. n. Rhysipolis biformis, Ashm., MS., Ins. Life, IV., p. 257.

♀—Length, 3.5 mm.; ovipositor a little longer than the abdomen. Head and thorax black, pubescent; abdomen ferruginous; anterior coxæ, all trochanters, except slightly on the upper surface, annulus at base of all tibiæ and all tarsi, honey-yellow or pale ferruginous; middle and anterior coxæ and all femora black; mesopleura reddish or piceous. Head quadrate, above smooth, polished, with a delicate occipital margin; face finely punctate with a sparse, rather long, whitish pubescence; mandibles black; palpi piceous. Thorax finely shagreened, the parapsidal furrows obsolete posteriorly but sharply defined anteriorly, the middle lobe just in front of scutellum depressed, rugulose with a slight median keel; meso-pleura smooth and pale or piceous at the middle, with a slight longitudinal sulcus; scutellum smooth, with a crenate furrow across the base; meta-thorax rugose, with a delicate median carina down the centre

slightly forked at apex. Wings subfuliginous, the stigma and venation brown; submedian cell longer than the median, the recurrent nervure not interstitial but joining the first submarginal cell at the lower apical angle; first abscissa of radius about half the length of the second. Abdomen ferruginous or reddish-yellow, the first and second segments rugose or shagreened, the following smooth, polished. In one specimen the basal part of the third segment, as well as the first two, is also shagreened.

In the ♂ the apical margins of the third and following abdominal segments are piceous; the antennæ are much longer than the body, brown-black, 36-jointed; the legs similar to the female, but with the femora more piceous, not black; otherwise as in female.

Hab.—Morgantown, W. Va.

Bred Sept. 14, 1891, from a Buprestid, or Longicorn, larva living under bark of dead Spruce *Abies nigra*.

I am doubtful about the position of this insect, as it might just as well be placed in the genus *Doryctes* as in *Rhysipolis*, having a close resemblance to *Doryctes radiatus* Cr., *D. maxilentus* Prov., *D. fartus* Prov., and other species in this genus.

Subfamily RHYSSALINÆ.

RHYSSALUS, Haliday.

(4) *R. pityophthori*, sp. n. Rhyssalus pityophthori, Ashm., MS., Ins. Life, IV., p. 257.

♀—Length, 1.2 mm.; ovipositor shorter than the abdomen. Black, shining; head transverse, smooth, impunctured; mandibles and palpi pale ferruginous; antennæ very little longer than the body, (?) 17-jointed. Thorax alutaceous, the parapsidal furrows distinct, the middle lobe with a median impressed line anteriorly. Wings hyaline, strongly iridescent, the stigma and nervures brown, the first abscissa of radius two-thirds the length of the second, the marginal cell long, extending to tip of wing. Legs, including coxæ, pale or honey-yellow. Abdomen oblong-oval, ferruginous, the ovipositor black.

Hab.—Morgantown, W. Va.

Bred July 29, 1891, from Yellow Pine twigs infested with *Pityophthorus*, sp.

Subfamily SPATHIINÆ.

SPATHIUS, Nees.

The following table will aid in determining the species in this genus known to me as occurring in our fauna :—

TABLE OF SPECIES.

Wings fuscous or blackish, with 3 white transverse bands (*i. e.*, one white band with the base and apex of wing white).....3

Wings fuscous, with one white band.....2

Wings hyaline or subhyaline, without bands.

Testaceous; pleura, metathorax and petiole blackish or fuscous.

Petiole very long and slender, two-thirds the length of the thorax; legs entirely pale yellow; antennæ 24-jointed. (♂, length, 2.5 to 3 mm.) ..... *S. longipetiolatus*, sp. n.

Testaceous; abdomen from apex of second segment black.

Petiole not more than half the length of thorax; legs pale yellow; antennæ 24-jointed. (♂, length, 2.1 mm.)..... *S. californicus*, sp. n.

Black; face, collar, mesopectus, legs, petiole and basal half of second abdominal segment, testaceous.

Petiole a little longer than half the length of thorax; hind femora subfuscous. Antennæ 23-jointed. (♂, length, 2 mm.) ..... *S. claripennis*, sp. n.

2. Black; head, apex of petiole, base of second segment, fuscous or piceous; all femora much swollen; trochanters, annulus at base of tibiæ and the tarsi, white; ovipositor twice the length of abdomen. Antennæ 34-jointed. (♀, length, 4 to 4.5 mm.)..*S. unifasciatus*, sp. n.

3. Species for the most part testaceous or brownish-yellow.....4

Species black or dark fuscous.

Collar, petiole and base of second segment, pale brownish-yellow; trochanters, base of tibiæ and the tarsi, yellowish-white; sometimes the mesopectus and head more or less rufo-testaceous; basal half of second abdominal segment always finely sculptured or shagreened; ovipositor 1½ to 2 times as long as the abdomen.

♀, antennæ 32 to 35-jointed; ♂, antennæ 25-jointed. (Length, from 2 to 4.5 mm.)..... *S. simillimus*, sp. n.

Ovipositor not longer than the abdomen.

Head polished, with traces of faint transverse striæ before the ocelli but none behind; second abdominal segment faintly granulated at base.

♀, antennæ 29-30; ♂, 26-jointed. (Length, 2 to 2.5 mm.).... .....*S. tomici*, sp. n.

Ovipositor half the length of abdomen.

Head transversely rugulose; second abdominal segment perfectly smooth, polished.

♀, antennæ broken. (Length, 3 mm.).....
.....*S. brachyurus*, sp. n.

4. Rust brown, disk of thorax and scutellum black.

Ovipositor nearly twice the length of the whole insect.

Head polished, although faintly transversely aciculated; abdomen elongate, black, shining, the petiole finely rugose, not longitudinally striated; the second segment with some faint aciculations only at base.

♀, antennæ 20-jointed, reaching only to the base of the metathorax. (Length 3.5 to 4 mm.).....
.....*S. Laflammei*, Prov.

Ovipositor not quite as long as the whole insect.

Head opaque, finely rugose, the rugæ posteriorly transverse; abdomen oblong-oval, the apical one-third of the second segment and following segments black polished; petiole coarsely longitudinally striated; basal half of second segment shagreened.

♀, antennæ multiarticulate (broken at tips). (Length, 5.5 mm.).....*S. floridanus*, sp. n.

Brownish-yellow or testaceous, sometimes varied with fuscous.

Ovipositor shorter than the body, usually shorter than the abdomen.

Head finely rugose and transversely aciculated; second abdominal segment basally feebly shagreened; ovipositor longer than the abdomen. (Length, 4.5 to 5 mm.).....*S. trifasciatus*, Riley.

Ovipositor shorter than abdomen.

Head polished without or with very faint transverse aciculations; base of second segment and the petiole yellow,

rest of abdomen black, the basal half of the second segment very finely shagreened. Antennæ 23-jointed, a little longer than the body. (♀, length, 2.8 mm.).. ....*S. Canadensis*, Ashm.

Head shining, transversely striated; basal two-thirds of second segment finely shagreened, the rest of abdomen smooth, polished. Antennæ 30-jointed, longer than the body. (♀, length, 3.5 mm.).....*S. pallidus*, sp. n.

Head opaque, minutely transversely rugulose; the second segment has the basal one-third finely shagreened, then followed by a smooth polished space and again shagreened, and polished again at apex. Antennæ longer than the body, more than 33-jointed (the tips broken off). (♀, length, 4 mm.)..... ..*S. brunneus*, Ashm.

Head smooth polished, with scarcely a trace of any transverse aciculations; second segment polished, impunctured. Antennæ 25-jointed. (♀, length, 3 mm.)..... .....*S. sequoiæ*, Ashm.

(5) *S. claripennis*, sp. n. Spathius clavipennis, Ashm, MS. (err. impr.), Ins. Life, IV., p. 257.

♂.—Length, 2 mm. Black; prothorax, mesopectus, petiole and basal half of second abdominal segment, testaceous or yellow; legs pale, the posterior femora and their tibiæ toward apex slightly dusky. Wings hyaline, the stigma and nervures brown. Antennæ 23-jointed, fuscous, the basal three or four joints pale yellowish. The head is polished, with some faint transverse aciculations on the vertex. Thorax subopaque, finely granulated or shagreened; the petiole longitudinally striate.

Hab.—Morgantown, W. Va.

Bred April 20, 1892, from *Polygraphus rufipennis* living under the bark of dead *Abies nigra*.

(6) *S. unifasciatus*, sp. n. Spathius unifasciatus, Ashm., MS., Ins. Life, IV., p. 258.

♀.—Length, 4 to 4.5 mm. Black; collar anteriorly dull ferruginous; apex of petiole and base of second segment reddish piceous; legs fuscous, anterior and middle coxæ and trochanters, posterior trochanters and annulus at base of all tibiæ, white; tarsi more or less pallid beneath. Antennæ 34-jointed, fuscous, the basal 3 or 4 joints pallid. The head is polished, the vertex faintly transversely aciculated, the frons and

face rougher; thorax closely granulated, opaque, the middle lobe posteriorly, pleura and metathorax, finely rugulose, the latter indistinctly areolated. Wings fuliginous, with a white band across the middle from the base of the stigma, the apex of the wing showing scarcely any white. All the femora are very much swollen, while the abdomen, except the petiole, is smooth, polished; petiole longitudinally striate, somewhat rugose basally.

Hab.—Morgantown, W. Va.

Bred April 29, 1892, from *Scolytus 4-spinosus* living under the bark of *Carya alba.*

(7) *S. simillimus*, sp. n.

♂, ♀.—Length, 2 to 4.5 mm. Black; collar, mesopectus and petiole pale ferruginous or brownish-yellow. Head above transversely aciculated; thorax opaque, closely granulated; the middle mesothoracic lobe posteriorly and the metathorax finely rugose, the latter faintly areolated; petiole striate. Wings fuscous, white at base and tips, and with a transverse white band from the base of stigma. Antennæ in ♀ 32 to 35-jointed, in ♂ 25-jointed, fuscous, pale toward base. Legs fuscous; the coxæ and trochanters, annulus at base of tibiæ and the tarsi, white. Abdomen, except petiole and base of second segment, black, the basal half of the second segment shagreened; ovipositor as long or very little shorter than the body.

Hab.—Morgantown, W. Va.

Bred May 18 and 25, 1892, from *Agrilus bilineatus* living in White Oak stump.

(8) *S. brachyurus*, sp. n. Spathius brevicaudus, Ashm., MS. (Olim. preoc.), Ins. Life, IV., p. 258.

♀.—Length, 3 mm.; ovipositor half the length of abdomen. Much like *S. simillimus*, but with the lower part of head, the prothorax, metathorax and petiole brownish, the ovipositor very much shorter, in *simillimus* being about as long as the whole insect, while in *brachyurus* it is only half the length of the abdomen. The head is transversely rugulose; the legs and antennæ brown, the tibiæ not annulated with white, the femora not especially thickened; while the second abdominal segment is perfectly smooth and polished.

Hab.—Morgantown, W. Va.

Bred Nov. 10, 1890, and March 15, 1891, from *Dryocoetes autographus* living under bark of dead *Abies excelsa.*

(9) *S. pallidus*, sp. n.

♀.—Length, 3.5 mm.; ovipositor a little longer than the abdomen. Pale ferruginous or honey-yellow; coxæ, trochanters, base of tibiæ and tarsi, whitish. Head shining, transversely striated; antennæ 30-jointed, longer than the body; petiole as long as the body of abdomen, striated; second abdominal segment nearly twice the length of the third, the basal two-thirds finely shagreened or coriaceous, the following segments polished, impunctured. Wings fuscous, whitish at base and tips, and with a white band across from base of stigma. The parapsidal furrows are distinct, converging and meeting at base of scutellum, the middle lobe thus formed being smooth and not rugose at base just in front of the scutellum, as in the other species.

Hab.—Morgantown, W. Va.

Bred from *Tomicus cacographus* living in Yellow Pine.

Subfamily HECABOLINÆ.

LYSITERMUS, Förster.

(10) *L. scolyticida*, sp. n. Lysitermus scolyticida, Ashm., MS., Ins. Life, IV., p. 258.

♀.—Length, 2.1 mm. Black, shining, impunctured; mesoscutum with two distinct furrows; metathorax finely rugose; wings hyaline, nervures brown; legs honey-yellow, the posterior tibiæ and tarsi subfuscous. Antennæ 17-jointed, black, the three basal joints yellow. Abdomen oblong-ovate, composed of but three visible segments, the first segment and the second at the extreme base striated, otherwise smooth and polished; ovipositor as long as the abdomen.

Hab.—Morgantown, W. Va.

Bred April 30, 1891, from *Scolytus 4-spinosus* living under Hickory bark.

CÆNOPHANES, Förster.

In describing the species in this genus reared by Prof. Hopkins, I have taken advantage of the opportunity to publish a table of the species known to me in our fauna, believing the characters given in the table sufficient for the recognition of all the species.

TABLE OF SPECIES.

Testaceous or brownish-yellow species.....2
Black or blackish-fuscous species.

Ovipositor longer than the whole insect.

Collar and legs yellow; abdomen piceous; first segment and basal two-thirds of second longitudinally striated, the second with a transverse impressed line at the middle.

Metathorax with two areas at base; antennæ in ♀ 24-jointed..... *C. longicaudus*, sp. n.

Metathorax rugose, but without areas at base; antennæ in ♀ 18-jointed.... *C. flavicollis*, sp. n.

Ovipositor not quite as long as the body.

Head piceous, polished; collar, mesosternum, legs and basal half of abdomen, yellow; antennæ 24-jointed; metathorax with two smooth areas at base..... *C. consimilis*, sp. n.

Ovipositor scarcely as long as the abdomen.

Head minutely punctulate, subopaque; legs, base of second abdominal segment and the three terminal segments, yellowish; first segment, basal two-thirds of second and base of third and fourth, striated; the second segment with two transverse impressed lines; antennæ 28-jointed ..... *C. languriæ*, sp. n.

Head transversely aciculated, shining; legs brown, trochanters and tarsi yellow; abdomen piceous black, the first and second segments striated, the following smooth; antennæ in ♀ 19-, in ♂ 18-jointed..... *C. atrata*, Ashm.

Ovipositor half the length of abdomen.

Head polished, impunctured; legs yellowish-white; abdomen piceous or yellowish at base of second segment, also sometimes at apex of first; first segment, basal two-thirds of second and base of third, striated; rest of abdomen smooth, shining, the second segment with a transverse impressed line at the middle; antennæ in ♀ 23-jointed.. ..... *C. anthaxiæ*, sp. n.

Head transversely aciculated; legs brownish-yellow, the hind coxæ black; abdomen finely rugose, the first segment and the following segments (except apical portion of the 3, 4 and 5, two-thirds of the 6 and the 7, which are polished), striated; second segment with two longitudinal furrows; antennæ 25-jointed..... ..... *C. borealis*, Ashm.

Legs pale brown, trochanters and tarsi whitish; abdomen elongate ovate, black, polished, the first two segments and

the third at extreme base striated, the second segment without a transverse furrow; ♂, antennæ 22-jointed..... .....*C. pityophthori*, sp. n.

Ovipositor one-third the length of abdomen.

Head smooth, polished; collar, mesosternum, second abdominal segment and the apex of abdomen, more or less, yellow; first segment, basal two-thirds of second, and base of third and fourth, striated; the second with two transverse impressed lines; antennæ 25-jointed..... ....*C. floridanus*, sp. n.

2. Ovipositor longer than the abdomen.

Head black or piceous black, polished, impunctured; scutellum with two large foveæ at base; metathorax with two large areas at base, posteriorly rugose or reticulated; antennæ in ♀ 31-jointed.....*C. atriceps*, sp. n.

Ovipositor two-thirds the length of abdomen.

Metathorax with two areas at base.

Head transversely aciculated.

First abdominal segment and basal two-thirds of second striated; rest of abdomen smooth, polished, the second segment with a transverse impressed line; antennæ in ♂ and ♀ 25-jointed... .....*C. hylotrupidis*, sp. n.

First abdominal segment, basal two-thirds of second, and the bases of the third and fourth, striated, the second with two transverse impressed lines; antennæ in ♂ 30-, in ♀ 25-jointed..... .....*C. aciculatus*, sp. n.

Ovipositor less than half the length of the abdomen.

Metathorax with a petiolate, diamond (◊) shaped area.

Head transversely aciculated; first abdominal segment, the second, except at apex, and base of third and fourth, striated, the second with a transverse impressed line at basal one-third and a transverse depression a little beyond; antennæ in ♀ 36-jointed..*C. prodoxi*, Riley.

Metathorax rugose, reticulated, with two areas at base.

Head smooth, polished; first abdominal segment,

basal two-thirds of second, striated, the second with a transverse furrow at the middle.....
.....*C. melleus*, Riley.

Ovipositor one-third the length of abdomen.

Metathorax rugose, but not areolated; first abdominal segment and basal half of second, striated; rest of abdomen smooth, polished; antennæ in ♀ 18-, in ♂ 19-jointed....
.....*C. Koebelei*, Riley.

Metathorax with a petiolate, diamond-shaped area at the middle and with two areas at base; first, second and base of third abdominal segments striated, the rest smooth, polished; antennæ in ♀ 24-jointed, in ♂ 27 or 28-jointed.....
.....*C. Chittendenii*, sp. n.

(10) *C. languriæ*, sp. n. Caenophanes languriæ, Ashm., MS., Ins. Life, IV., p. 258.

♂, ♀.—Length, 2.5 to 3 mm.; ovipositor scarcely as long as the abdomen. Head and thorax black, the parapsidal furrows, collar and mesopleura ferruginous, with sometimes the face and orbits ferruginous, the second abdominal segment with 2 transverse impressed lines; abdomen in ♂ pale ferruginous, in ♀ darker, with the base of second abdominal segment and the three last segments yellowish. Head minutely punctulate; antennæ in both sexes 28-jointed; wings sub-hyaline, the first and second branches of the radius equal in length; first abdominal segment, basal two-thirds of second, and base of the third, and in the ♂ the sutures at base of 3, 4 and 5, striated.

Hab.—Morgantown, W. Va.

Bred Dec. 24, 1891, and Feb. 24, 1892, from *Languria* larvæ living in pith of *Ambrosia trifida* and *artemisiæfolia*.

(11) *C. anthaxiæ*, sp. n. Caenophanes anthaxiæ, Ashm., MS., Ins. Life, IV., p. 258.

♂, ♀.—Length, 2.5 to 3 mm.; ovipositor half the length of abdomen. Head and thorax in ♂ black, in ♀ fuscous; the head polished, impunctured; thorax closely microscopically punctate, the middle lobe posteriorly rugose; abdomen ferruginous, the first segment, basal two-thirds of the second, and the suture between segments 3 and 4, striate; legs pale yellow; wings hyaline, the first abscissa of radius two-thirds the length of the second. Abdomen sometimes fuscous, with a pale blotch at the middle.

Hab.—Morgantown, W. Va.

Bred May 4 and June 24, 1892, from *Anthaxia viridicornis* infesting Willow; and May 26, from an *Agrilus* larva living under the bark of Dogwood, *Cornus florida*.

(12) *C. pityophthori*, sp. n. Caenophanes pityophthori, Ashm. M. S., Ins. Life, IV., p. 258.

♂.—Length, 2 mm. Black; second abdominal segment at base and sometimes the petiole at apex ferruginous; head shining, faintly transversely aciculated on vertex; thorax opaque, minutely granulated; metathorax areolated, the pleura rugose; antennæ 22-jointed, black, the 3 basal joints yellow; abdomen elongate ovate, black, polished, the first two segments and the third at extreme base or the suture striated. Legs pale yellowish. Wings hyaline, the first abscissa of radius less than two-thirds the length of the second.

Hab.—Morgantown, W. Va.

Bred Feb. 24, 1892, from *Pityophthorus* sp. living under the bark of a small dying Spruce, *Abies nigra*.

(13) *C. hylotrupidis*, sp. n. Caenophanes hylotrupidis, Ashm., MS., Ins. Life, IV., p. 258.

♂, ♀.—Length, 2.5 to 3 mm.; ovipositor two-thirds the length of abdomen. Pale ferruginous; metathoracic sutures fuscous. Head above transversely aciculated; thorax finely granulated, the middle lobe posteriorly strongly rugose; metathorax, except the two basal areas, rugose, and with a A-shaped carina at the middle; first abdominal segment and basal two-thirds of the second striate, rest of abdomen smooth, polished, the second segment with a transverse impressed line at the middle. Antennæ in both sexes 25-jointed. Wings hyaline, the stigma and nervures pale brown, the first and second branches of the radius about equal in length.

Hab.—Morgantown, W. Va.

Bred April 4, 1891, from *Hylotrupes ligneus* living in *Juniperus virginiana*.

Subfamily HELCONINÆ.

HELCON, Nees.

(14) *H. occidentalis*, Cr. Helcon tetrapodii, Ashm., MS. (olim), Ins. Life, IV., p. 259.

Bred July 14, 1891, from *Tetrapodium cinnamoplerum* living in sap wood of Spruce log *Abies nigra*.

Subfamily ALYSIINÆ.

ADELURA, Förster.

(15) *A. tibialis*, sp. n.

♂.—Length, 1.5 mm. Polished black; lower half of head, two basal joints of antennæ, legs, including coxæ, except the posterior tibiæ which are fuscous, and first and second abdominal segments, honey-yellow. Head transverse, wider than the thorax, the ocelli close together. Palpi white. Antennæ 24-jointed, black, much longer than the body. Thorax smooth, without distinct parapsidal furrows, or only indistinctly impressed anteriorly. Mesopleura piceous; metathorax almost smooth, the surface wrinkled posteriorly. Wings large, hyaline, the tegulæ white, the costa and the elongate stigma black; rest of venation brown; the first branch of the radius very short, the second very long, about twice the length of the first transverse cubital nervure; the second submarginal cell very long, twice as broad at base as at apex; recurrent nervure almost interstitial received in the angle of the second submarginal cell; submedian cell a little longer than the median. Abdomen oblong-oval, smooth, shining, the first segment finely rugose.

Hab.—Morgantown, W. Va.

Subfamily DACNUSENÆ.

COELINIUS, Nees.

(16) *C. Hopkinsii*, sp. n.

♀.—Length, 4 mm. Black, shining; prothorax, legs, including coxæ, and the second abdominal segment, brownish-yellow; mandibles rufous; palpi white. Head oblong, smooth and polished; face punctate with a median carina, pubescent. Antennæ 33-jointed, black, as long as the body; the two basal joints, and the flagellum beneath for more than half its length, brownish-yellow. Thorax smooth, shining, trilobed; mesopleura separated from the mesosternum by a large longitudinal furrow and with a triangular fovea posteriorly; the surface, except anteriorly where it is sparsely punctate, is smooth and shining; metathorax rugose. Wings hyaline, the venation brown-black, the costa towards base and the tegulæ yellowish. Abdomen twice as long as the thorax, compressed beyond the second segment; except the second segment, black, smooth and shining; the first segment is one-third longer than the second, rugulose, smoother at apex.

Hab.—Morgantown, W. Va.

SYNOPSIS OF THE ASILID GENUS DIOCTRIA.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

The following table includes all the species of *Dioctria* known to me as occurring in North America :—

1. Wings on the basal half yellow, on the apical half blackish.....2
   Wings not marked like this, nearly uniformly blackish.....3
2. Legs wholly black ; length, 4 mm.....*parvulus*, n. sp.
   Legs partly reddish-yellow ; length, 7 mm.....*Sackenii*, Will.
3. Abdomen wholly black.....4
   Abdomen and legs partly reddish.....6
4. Legs wholly black.....5
   Legs having base of tibiæ broadly reddish-yellow ; mystax black .....*nitida*, Will.
5. Mystax black .....*albius*, Walk.
   Mystax red.....*resplendens*, Lw.
6. Antennal style nearly half as long as the third joint, coxæ red .....*pusio*, O. S.
   Antennal style one-sixth as long as the third joint, coxæ black .....*rubidus*, n. sp.

DIOCTRIA PARVULUS, n. sp. ♂.

Wholly black, shining. Pile of head light yellow, that on sides of face very sparse, extending to base of antennæ. First two joints of antennæ subequal in length, the third joint as long as the first two taken together ; style one-sixth as long as the third joint, thick and blunt. Pile of thorax rather abundant, that on abdomen very sparse and short, bright yellow. Base of wings to beginning of fifth posterior cell yellowish-white, beyond this blackish ; all posterior and the anal cell open. Length, 4 mm. Los Angeles County, Cal. Two specimens.

DIOCTRIA RUBIDUS, n. sp. ♂.

Head black, the pile light yellow ; face with a large fovea above the centre, below which is a large gibbosity bearing the rather dense mystax ; face covered with a very short, brassy yellow pubescence, and with a few pile on each side above. Antennæ black, first joint one and a-fourth times as long as the second, the third joint slightly longer than the first two taken together, the style one-sixth as long as the third joint, very robust, its tip blunt. Thorax and scutellum shining black, quite thickly light yellow pilose. Abdomen shining reddish-brown, except the first segment which is black, but sometimes the second segment and a large portion of the third and fourth segments are also black ; pile very sparse and short, light yellow. Legs yellowish, the coxæ, trochanters, apical three-fourths of hind tibiæ, and sometimes also of the other tibiæ, and all the tarsi, black. Wings blackish, all posterior and the anal cell open. Halteres yellow. Length, 7 mm. Los Angeles County, Cal. Three specimens.

NOTES FROM THE CORNELL INSECTARY.

I.—SOME RESULTS OF A TRAP LANTERN EXPERIMENT.

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

May 1, 1889, the Entomological Department of the Cornell Agricultural Experiment Station set six trap lanterns, at considerable distances apart, on the University farm for the purpose of determining their value as an insecticide. Each trap consisted simply of a common lantern set in a pan of water whose surface had a thin film of kerosene upon it to facilitate the destruction of the insects caught. The lanterns were kept burning every night until Oct. 15, 1889, or until no more insects were attracted. The captured insects were taken from the pans every morning and placed in alcohol, those from each lantern being kept separate. So many outside influences, as other lights, the smallness of the area covered, etc., entered into the case, that practically no results were obtained from the different locations of the lanterns in the number of specimens caught by each lantern in any of the species thus far studied. Therefore, in the tables which follow, the total catch for each day from all the lanterns is placed under that date.

An immense amount of material was taken, representing nearly every order of insects; the moths, however, included a majority of the specimens. But comparatively little of the material has yet been studied. Several species of Cut Worm Moths, the Apple-tree Tent Caterpillar Moth, and all the species of the May Beetles taken in the lanterns have been determined by the writer. As all of these are of economic importance, the following tables showing the number of specimens of each species taken each day will be of economic interest as showing the period of flight, when most numerous, the relative commonness of the different species, and many other questions of importance, as we shall see.

TABLE I.—*Clisiocampa americana* taken at Trap Lanterns in 1889:—

DATE.	MALES.	FEMALES.
June 17	1	
" 18	2	
" 20	4	
" 21	3	
" 22	6	
" 25	11	4
" 26	35	
" 27	85	8
" 28	46	5
" 29	100	33
" 30	61	25

TABLE I.—*(Continued).*

DATE.	MALES.	FEMALES.
July 1	62	6
" 2	30	
" 3	29	4
" 4	26	
" 5	7	1
" 6	1	1
" 7	1	
" 8	1	1
" 9	1	
" 18	1	
Total	513	88

TABLE II.—*Agrotids* taken at Trap Lanterns in 1889 :—

DATE.	*F. subgothica.*		*F. jaculifera.*	
	♂	♀	♂	♀
July 4				1
" 12	1			
" 17				1
" 21	2			
" 23	1			
" 26	1			
" 27	2			
" 28	1			
" 29	6			
" 30	2	2		
" 31	12	2		
Aug. 1	7	2		
" 2	10			2
" 3	9	1	1	
" 4	17	3	1	
" 5	30	4	3	
" 6	5			
" 7	3			
" 8	5		1	
" 9	32	1		
" 10	7	1	4	
" 11	9	2		
" 12	5			
" 14	30	3	1	2
" 15	59	1	2	
" 16	42		1	
" 17	76	10		2
" 18	124	3	1	
" 19	101	9	5	
" 20	108	6		
" 21	100	10	1	1
" 22	108	6		
" 23	63	2		
" 24	122	10		

TABLE II.—*(Continued).*

DATE.	*F. subgothica.*		*F. jaculifera.*	
	♂	♀	♂	♀
Aug. 25	209	8		
" 26	110	7		
" 27	90	2		
" 28	93	3		
" 29	97	4		
" 30	53	2		
" 31	108	6		
Sept. 1	60	8		
" 2	65	2	1	
" 3	50			
" 4	87	4		
" 5	23			
" 6	37	2		
" 7	8			
" 8	16	3		
" 9	1			
" 11	1	2		
" 14	1			
" 16	2	1		
" 17	1			
" 18		1		
Total	2240	142	22	9

One male of *Carneades redimicula* was taken on the 16th and a female on the 29th of July, and a female of *Carneades insignata* was caught July 11.

TABLE III.—*Lachnosterna* taken at Trap Lanterns in 1889 and 1892:—

DATE.	*fusca.*				*dubia.*				*ilicis.*			
	1889.		1892.		1889.		1892.		1889.		1892.	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
May 6	1											
" 7	1											
" 8	1	1				1						
" 10					1							
" 11	1	1			2	1						
" 12					1	1						
" 13		1										
" 14	1	1			2							
" 16	1				6							
" 17	2	1			1							
" 18	8	1				2						
" 19	22				5	1						
" 20	4				4							
" 21	21				4	1						

TABLE III.—*(Continued).*

DATE.	*fusca.*				*dubia.*				*ilicis.*			
	1889.		1892.		1889.		1892.		1889.		1892.	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
May 22	1	2			1							
" 25	16	2			4	3						
" 26			2		1							
" 28					1							
" 30			10	2	1			1				
" 31	1	2	8				2					
June 1	131	5			3				2			
" 2			3		2	1						
" 3	4	1	3		6		4					
" 4	13	1	1		2							
" 5	1	1				1						
" 6			1					1				
" 7			1				*1					
" 8		1				1						
" 9	8	2			1				1			
" 10	11	3	2	1								
" 11	4	1	4									
" 13		1	12	1		1					1	
" 14	1	2	54	1				1				
" 15	6	1	13	1	1				1			
" 16	3		5						1			
" 17	3	2	11	1							3	
" 18	6		1									
" 19			1	1								
" 20	3	2	32	2							1	
" 21	1		35	2								
" 22	4	1	28	1		1	1					
" 23			2	1								
" 26	2								1			
" 27	8	1							1			
" 28	3		1	1					2			
" 29					1				1			
" 30	1								1			
July 1									5			
" 2	1								4			
" 3	1								1			
" 4									1			
" 5	1					1						
" 14											1	
" 19									1		1	
" 23									3		1	
" 28											1	
" 31									1		1	
	207	37	234	15	30	10	9	3	27		10	

In this table are also included the results of the specimens caught in one trap-lantern which was kept running during 1892, from May 20 to Oct. 1. In 1889 there were also taken two specimens of *grandis*, June

20 and 27, both males; four *hirticula*, two males and two females, the former taken July 1 and 19, the latter June 14 and July 22; two males of *balia* taken June 1; two males of *hirsuta* taken May 20 and June 3; and one male of *quercus* was taken June 1. In 1892, one male of *grandis* was taken June 21; three males of *hirticula* on June 11, July 15 and 26; and two males of *hirsuta* were taken on June 2 and 3. Thus eight species were represented in the trap lantern material; at least twenty-three species should be found in our State.

From Table I. we learn that *Clisiocampa americana* flies from June 17 to July 18, occurring in the greatest numbers during a period of about ten days from June 26 to July 4; over 92 per cent. of the moths being taken at this time.

Table II. shows that *Feltia subgothica* is excessively abundant in this locality, nearly 2,400 specimens having been taken. I believe that more specimens of this moth were taken than of any other species of insect. Although the species flies from July 12 to Sept. 18, there is nothing to indicate more than one brood. Other experiments at the Insectary show that the insect hibernates in the larval state, and it is said that the change to a pupa takes place about July 1. As will be seen in the table, the adults appear in the greatest numbers from Aug. 14 to Sept. 6, over 97 per cent. of the moths being taken during these three weeks.

A glance at Table III. will show that *fusca* is by far the most numerous species in our vicinity; out of 694 specimens of *Lachnosterna* taken in the two years, 83 per cent. of them are *fusca*. *Dubia* and *ilicis* are comparatively common, while *hirticula*, *hirsuta*, *grandis*, *balia* and *quercus* are rare. In 1889 *fusca* flew from May 19 to June 10 and reached its climax on June 1, when 39 per cent. of them were taken. In 1892, however, *fusca* did not begin to fly until May 26 and stopped June 28, and it was the most numerous from June 13 to 28, or about two weeks later than in 1889. *Hirsuta*, *balia* and *quercus* seem to appear at about the same time as *fusca*, that is, during May and June But *ilicis*, *grandis* and *hirticula* do not appear until the latter part of June and during July. No *Lachnosterna* were taken after July 30, although the lanterns were run until Oct. 15, thus indicating that the emergence of the beetles in the fall is very uncommon, if it happens at all. This is confirmatory evidence of the conclusion which Prof. Forbes, of Illinois, and Prof. Perkins, of Vermont, have reached in their recent

studies of these insects. In the case of the three species which fly later in the season, it is possible that they either pass the winter as pupæ or do not pupate until spring.

The most striking thing to be learned, however, from each of these tables is the great disparity in numbers between the males and females caught. The males greatly outnumber the females in every instance. Only about 17 per cent. of the *Clisiocampa americana* in Table I. were females. But a little over 6 per cent. of the *Feltia subgothica* in Table II. were females, while nearly 41 per cent. of *jaculifera* were of this sex. Less than 12 per cent. of the *Lachnosterna fusca* in Table III taken in 1889, and but little over 6 per cent. of those taken in 1892, were females; with *dubia* the proportion of females is greater, being about 32 per cent.; no females of *ilicis* were taken in either year.

This great preponderance of the males over the females has also been noticed in every other species of the trap lantern material which has been studied of whatever order. It indicates that the males are much more active than the females, and is of the greatest importance when considering the insecticidal value of the trap lantern. For undoubtedly many of the males have copulated before being caught, and enough others remain uncaptured to fertilize the remaining females. Therefore the perpetuation of the species is provided for, and the insecticidal value of the lantern is rendered too small to be practicable.

BOOK NOTICE.

THE BUTTERFLIES OF NORTH AMERICA. Third Series, Part XIII.

Another part of Mr. Edwards's magnificent work has just appeared, and for beauty of illustration and interest of the letter-press, it perhaps surpasses all previously issued parts. The first plate shows the type of *Chionobas Chryxus*, var. *Calais*, Scudder, and the accompanying letter-press gives some interesting data collected by Mr. T. E. Bean concerning a similar form found at Banff, in the Rocky Mountains. The second plate shows in full all stages of the rare Canadian species, *C. Jutta*. This is accompanied by 14 pages of letter-press, in which nearly everything that is known concerning this species in America is related in a most entertaining manner. To the Rev. T. W. Fyles, F. L. S., of South Quebec, belongs the honour of being the only person so far who has reared *Jutta* from the egg to imago and described the different stages.

What the writer deems the most interesting feature in the life of this species is referred to, but Mr. Edwards's view of the matter seems to be different from his. Speaking of larvæ which hibernate after the first or second moult of a brood, part of which reach full growth the first autumn, he says :—"If any of these small larvæ run their full course, it seems certain that their butterflies should show themselves at least a month later than the 15th of June, and I do not understand why there is not a second flight." The writer has had the opportunity four times of breeding the species from the egg through the first winter, and all of the specimens hatched from eggs laid at Ottawa, Quebec, Banff and Nepigon, went into hibernation after the first or second moult ; one larva, however, of five sent by Mr. Edwards, fed straight on and reached full growth before winter set in. Those which revived the following spring fed slowly and did not attain full growth until the autumn, as related of this species and of *Chionobas Macounii* in Annual Report Ent. Soc., Ont., 1888, p. 7.

The third plate, also, figures two rare species of the same genus, which may be included in the Canadian fauna, *Crambis*, from Labrador, and a mountain species, named *Brucei* by Mr. Edwards, which has been taken by Mr. Bean, at Banff. The preparatory stages of the latter are beautifully illustrated in great detail, and it is seen that the larva resembles very closely that of *C. Semidea*. There are some critical notes concerning the synonymy of some allied species, which will be read with interest by students of this difficult genus.

We feel sure that all entomologists will hail with pleasure the appearance of this superb contribution to the knowledge of our Diurnal Lepidoptera, and we trust that the talented and genial author may be spared for many years to carry on this great work which has cost him so much.

J. FLETCHER.

[We were delighted to hear that Mr. Edwards has received a grant of $500 from the Bache Fund of the National Academy of Sciences to assist him in the completion of his publication on the Butterflies of North America.—ED. CAN ENT.]

NOTES.

LUMINOUS WORMS.

Driving from Hudson to Como on the 23rd of September, 1892, about 8 p.m., the night being warm and damp, I was much surprised to see on the hard road something luminous, emitting quite as strong a light as the glow-worm in England. We stopped quickly, but before I could get back the few yards it had disappeared. Some half mile further we passed another, which also, before I could get to it, disappeared. Can any of your readers say what these were? Their sudden disappearance and our failing to find them, though we struck a match in both cases, would lead me to think they were some sort of earth worm, as these draw themselves quickly into their holes when disturbed. How else is their sudden disappearance to be accounted for?

LACHLAN GIBB.

The cells of *Megachile*, which I send, were found in rather a peculiar place last September, being attached to the trimmings of a dress which was inside a wooden chest placed on a gallery in Montreal.

LACHLAN GIBB.

CORRESPONDENCE.

LARVOPHAGOUS CATERPILLARS.

Sir: On reading in the issue of the CANADIAN ENTOMOLOGIST for January of Larvophagous caterpillars of *P. philenor*, I was reminded of an observation which I made last summer. I had at that time several larvæ of *Danias archippus* in a wire cage, and supplied them frequently with milkweed leaves, which they devoured voraciously. On one occasion, owing to a delay in getting leaves, their supply became exhausted, and in a short time—not more than an hour or two, I should think—one of them attacked another which was about to change to a chrysalis, and began eating it. Some of the others joined, and by the time the leaves were obtained fully half of the unfortunate caterpillar had disappeared. They ate it very slowly, not being hungry enough to relish it, I suppose. My brother tells me that he has seen a larva of *P. asterias* greedily eating the chrysalis of one of its kind which was hung on a fence.

WILLIAM L. W. FIELD, Guildford, Conn.

Mailed February 28th.

The Canadian Entomologist.

VOL. XXV. LONDON, APRIL, 1893. No. 4.

SOME NEW LOCUSTIDÆ FROM INDIANA.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

During the past four years the writer has been getting together a collection of *Locustidæ* from various parts of the State of Indiana, with a view of preparing a general descriptive paper of the species of that family found in the State. In working over the material thus gathered thirty-seven species are found to be represented, four of which are evidently new to science. Of the four, three belong to the genus *Orchelimum* and one to the genus *Conocephalus*. The former genus is represented in the collection by ten species and the latter by four. Below is given a description of each of the four species believed to be new, together with such notes concerning the distribution of each as I find in my field note-book.

CONOCEPHALUS, Thunberg.

Conocephalus palustris, nov. sp.

A small but comparatively heavy-bodied species, having the cone of the vertex devoid of black markings and without a basal tooth; ovipositor very short and broad; posterior femora armed beneath on both carinæ.

Cone of the vertex short and stout, the tip round, the deflexed front with a dull median carina. Pronotum short, broad, the posterior margin regularly rounded, the lateral carinæ well defined, the entire surface thickly and rather deeply punctate. Tegmina long and rather narrow, regularly rounded to the apex; of a more delicate texture than in either *C. ensiger*, Harris, or *C. robustus*, Scudder. Fore and middle femora with two short spines on the apical third of the lower outer carina. Hind legs short, the tibiæ but little more than half as long as the closed tegmina; the femora with plainly visible spines on both of the inferior carinæ, eight on the outer and six on the inner. Ovipositor a little shorter than the hind tibiæ, broadest at a point about two-thirds the distance from the base, thence tapering regularly to a sharp apex.

General colour a very bright grass green. Fastigium tipped with dull yellow, which extends half way down the sides. Labrum and apical segments of all the palpi a rose red tinged with violet. Tarsi somewhat infuscated. Antennæ and apical third of ovipositor reddish-brown.

Measurements.—Female—Length of body, 27 mm.; of fastigium in front of eye, 2.75 mm.; of pronotum, 7 mm.; of tegmina, 37 mm.; of hind femora, 20 mm.; of hind tibiæ, 19.5 mm.; of ovipositor, 19 mm.

This handsome species of *Conocephalus* belongs to the same group as *C. robustus* and *C. crepitans*, Scudder, but is smaller and of a more uniform and brighter green than either of those species, besides having shorter legs, ovipositor, etc. It is described from a single female taken October 24, from the fallen grasses on the margins of a large low-land pond in Vigo county. This pond is surrounded on all sides by heavy timber, and its margins have yielded a number of interesting Orthoptera found nowhere else in the county. Among them are *Leptysma marginicollis*, Serv., *Paroxya atlantica*, Scudder, *Anaxiphus pulicarius*, Sauss., *Phylloscirtes pulchellus*, Uhler, and *Xiphidium nigro-pleurum*, Bruner. The first four mentioned are insects of a southern range, and perhaps *C. palustris* will in time be found to be more common southward.

ORCHELIMUM, Serville.

Orchelimum indianense, nov. sp.

A slender-bodied insect, with a dark median streak down the face, and having the posterior femora unarmed beneath. The cone of the vertex is short, rather narrow, with a rounded apex. The tegmina narrow, tapering, a little shorter than the wings, and of a delicate, almost gauze-like, texture. Posterior femora slender, shorter than the closed tegmina. Anal cerci of male of medium size, longer than the subgenital plate, tapering to a dull point; the basal tooth short, with a broad base and a very sharp point. The ovipositor of female of less than average width and length, the apical half with a gentle upward curve.

Colour of dried specimens: Tegmina and wings a transparent whitish, tinged with green on the front or lower, longitudinal nerves; the cross nervules of the latter darker. Sides of pronotum and abdomen, and all the femora, light green; the tibiæ and tarsi of a brownish hue. Face yellowish-white, with a dark fuscous stripe, the width of the labrum, starting with the mouth and passing upward to the vertex, where it narrows to the width of that organ; then, broadening on the occiput, it passes back to the front border of the pronotum, where it divides into

two narrow streaks, which enclose a whitish area and extend a little beyond the posterior transverse suture, where they taper to an end. Subgenital plate of male yellow. Basal third of ovipositor dark brown, the remainder light reddish-brown.

Measurements.—Length of body, ♂, 17 mm.; ♀, 17.5 mm.; of pronotum, ♂ and ♀, 4 mm.; of tegmina, ♂, 20 mm.; ♀, 18 mm.; of hind femora, ♂, 14 mm.; ♀, 14 5 mm.; of ovipositor, 7.5 mm.

This graceful and prettily marked species was found to be quite common among the rank grasses and sedges growing about the margins of a tamarack swamp near Kewanna, Fulton county. It was first taken on August 26th and again on September 24th, when it appeared more plentiful than before. It is the smallest and most slender of the ten species of the genus so far known to occur in the State, and its markings are very distinct from those of any of the others.

Orchelimum campestre, nov. sp.

A species of less than medium size, with the wing-covers narrow and of almost equal width throughout, the posterior femora unarmed beneath, and the ovipositor short and narrow.

Cone of the vertex prominent, narrow, rounded at the apex; the sides of the frontal deflexed portion rapidly converging to form a very acute wedge. Wing-covers long, narrow, not widened in the middle as in *O. vulgare*, *concinnum*, etc., tapering slightly on the apical third to a rounded end; their length equalling that of the wings in the ♂, a little shorter in the ♀. Posterior femora with the basal half quite stout, the length less than that of the tegmina. Cerci of male slender, cylindrical, somewhat pointed, the apical half curved slightly outwards, the basal tooth short and weak. Ovipositor short, narrow, moderately upcurved, and tapering to a delicate point.

Colour.—Tegmina and wings almost uniform transparent olivaceous brown. The usual dark reddish-brown band upon the occiput and disk of pronotum is margined on the latter with two very narrow and darker brown stripes, which extend back to the middle of the posterior lobe of the pronotum. Face, and usually the hind femora, a dirty olive brown; the latter, when dry, with a blackish longitudinal band on the exterior face. In the female the only green on the body is on the lower part of the sides of the pronotum and on the anterior femora. The only male at hand has the posterior femora green, but otherwise is coloured like the females. Ovipositor light reddish-brown.

Measurements.—Length of body, ♂, 17.5 mm.; ♀, 19 mm.; of pronotum, ♂, 4.5 mm.; ♀, 5 mm.; of tegmina, ♂, 20.5 mm; ♀, 24.5 mm.; of antennæ, ♂, 46 mm.; of posterior femora, ♂, 17 mm.; ♀, 17.5 mm.; of ovipositor, 7 mm.

This dull coloured grasshopper has been found in small numbers in both Vigo and Fulton counties, in upland prairie meadows, where it frequents the tall grasses, usually in company with *Xiphidium strictum*, Scudder.

It is a smaller and more slender bodied insect than the common *O. vulgare*, Harris, and has a shorter and narrower pronotum and a much smaller ovipositor than that species.

Orchelimum Bruneri, nov. sp.

A species of about the same length, but less robust than *O. vulgare*, Harris, having the posterior femora armed beneath, and the ovipositor very broad, nearly straight and of more than average length.

Cone of the vertex narrow, moderately elevated, rounded at apex. Tegmina long and narrow, a little shorter than the wings. Posterior femora rather stout, the apex, when appressed, not quite reaching the tip of ovipositor; armed beneath on the apical half with three or four small spines. Cerci of male stout, acuminate, with the internal tooth prominent.

Ovipositor very similar to that of *O. gladiator*, Bruner, being very long and stout, nearly straight above, and with the under side of apical third sloping rapidly to the acute apex.

Colour of dried specimens.—With the exception of the ovipositor, which is a light reddish-brown, and the usual stripe on occiput and disk of pronotum, the whole body is a pale, transparent brownish-green, the green showing plainly only on the lower half of the side of pronotum and on the meso and metapleura. The reddish-brown dorsal stripe of occiput and pronotum is bordered laterally throughout its *entire* length with a very narrow one of much darker brown. When immersed in alcohol the reddish-brown stripe fades to a yellowish white, leaving the two lateral ones as prominent dark streaks, widest on the central portion of the frontal disk.

Measurements.—Length of body, ♂, 18 mm.; ♀, 20.5 mm.; of tegmina, ♂, 21 mm.; ♀, 25 mm.; of pronotum, ♂ and ♀, 4.75 mm.; of hind femora, ♂, 16.5 mm.; ♀, 18 mm.; of ovipositor, 10 mm. Described from 2 ♂s and 4 ♀s.

This species, the female of which is at once conspicuous by reason of the shape and size of its ovipositor, has been taken in small numbers only in Vigo Co., where it is found during August and September on the leaves and stems of a tall, broad-leaved knot-weed, *Polygonum amphibium*, L., which grows luxuriantly in the shallow waters about the margins of two or three large ponds in the Wabash River bottoms. Several other "green grasshoppers," notably among which are *Xiphidium attenuatum*, Scudder, and *Orchelimum nigripes*, Scudder, frequent this plant in immense numbers. Keeping company with them an occasional specimen of *O. Bruneri* is seen, but, being an active leaper, it often escapes amidst the dense foliage of the knot-weed before its capture can be effected. Its less robust body and longer armed posterior femora will readily distinguish this species from *O. gladiator*, the only other one which, to my knowledge, has an ovipositor shaped like that of *Bruneri*. The latter is named in honor of Prof. Lawrence Bruner, of Lincoln, Nebraska, one of the leading authorities on N. A. Orthoptera.

ON SOME BUTTERFLY LARVÆ NOT HITHERTO DESCRIBED.

BY HARRISON G. DYAR, BOSTON, MASS.

PHYCIODES CARLOTA, Reak.

Larva.—Head subcordate, apices slightly produced, mouth parts small; rough, tuberculate, hairy; colour black, a narrow white line above the mouth. Body robust, with short and thick conical, densely-bristly spines, arranged thus: on joint 2 one short stigmatal and one substigmatal, besides tubercles on the cervical shield; on joints 3–4, subdorsal, lateral and subventral; on 5–11, dorsal (single), suprastigmatal, substigmatal, 2 subventral; on 12, two dorsal (in line), subdorsal, superstigmatal, substigmatal and subventral (small); on joint 13, two subdorsal (in line). Cervical shield, anal plate, feet outwardly and spiracles black; body brownish red, with a dorsal and subdorsal black shaded line, most distinct in the segmental incisures.

Pupa.—Straight on ventral side; thorax with no prominence; abdomen arched, with five rows of slight blunt points, which also occur on thorax at the angulations, but slighter. Colour grayish, dull brown mottlings on a white ground. Length, 14 mm; width, 4 5 mm. Found on the ground feeding on an undetermined plant which was just starting, at Denver, Colorado, April 30, 1891.

THECLA GRUNUS, Boisd.

Larva.—Head testaceous, with a black shade on each side; width, 1.2 mm. Retracted beneath joint 2. Body flattened, tapering somewhat posteriorly but rounded, the segments arched. A subdorsal and subventral ridge, not very prominent. Dark or bluish-green, without white granulations, but having minute, brownish, piliferous dots, quite densely distributed. Obscure geminate dorsal, single subdorsal, stigmatal and subventral lines, pale whitish and broken, becoming later yellowish, and the subdorsal one distinct and almost continuous. The two subdorsal lines are 2.2 mm. apart. The pile on the body is longer and stiffer on the subventral ridge than elsewhere. A rounded, diamond-shaped, depressed, cervical shield situated about the centre of joint 2, on which the blackish, elevated, piliferous dots are smaller than elsewhere.

Chrysalis.—Suspended by the cremaster and a loop of silk. Short, thick, flat on the ventral side, rounded dorsally, with a very slight depression between the thorax and abdomen. Colour pale green, speckled with blackish (but faintly); a bright yellowish subdorsal line on the abdomen, faintly continued on the thorax, and a double dorsal row of yellowish dots on the abdomen.

Duration of this stage, fifteen days.

Food plant.—The young leaves of the live oak (*Quercus chrysolepis*, Liebm.). Larvæ from Yosemite, Cal.

NEW NORTH AMERICAN MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Crambus albilineellus, n. sp.

Expanse of wings, 26 mm. Head, palpi, thorax and fore wings dull ochre-yellow. The palpi are darker on the outside, and the subcostal, median and veins 5 to 10 are white. A stripe of lead-coloured scales extends from the base of the wing just above and parallel to vein 1 to the outer cross line, and a similar stripe occurs between this and the hind margin. Two lines cross the wing: The first is dark brown, and arising from a point a little before the middle of the costa forms an outward angle very near the costa and an inward angle on the subcostal vein, then a second outward angle is formed at the end of the median vein and from this point the line runs more or less distinctly across to the middle of the hind margin. The second line is dark brown but finer, dentate and edged on the outside with lead coloured scales, and runs from the costa before

the apex across to near the outer margin, thence across the wing nearly parallel with the outer margin. The space from the end of the cell to the apex is somewhat stained with brown. The terminal line is fine, black, and with a row of black dots in it. The fringe is concolourous with the adjacent part of the wing, but with slight metallic reflections. Hind wings fuscous, fringe lighter.

Described from one specimen taken in Southern California.

Crambus coloradellus, n. sp.

Expanse of wings, 22 mm. Head, palpi, thorax and fore wings, pale silvery straw colour; the palpi darker on the outside. A white stripe extends from the base of the wing through the cell to the outer margin, bifid beyond the cell. All the veins of the wing are more or less indicated by pale yellow, edged on each side with a more or less broken row of black scales. A pale yellow line crosses the wing at the end of the cell where it rounds outwardly and runs nearly straight and vertical to the hinder margin. The outer line is curved within the apex and runs straight to the hinder margin. Both of these lines are faint, and the outer one is edged on the outside with silvery scales. The terminal row of black dots is in a straight line, and does not follow the margin at the lower part where it rounds outwardly. Fringes silvery metallic. Hind wings white, slightly stained with pale fuscous on the apex.

Described from one example from Colorado.

Alucita fishii, n. sp.

Expanse of wings, 20 mm. Thorax and fore wings pure white, the latter with a few brown atoms scattered over the costal part of the wing, and more abundant before the fissure, where it almost defines itself as a triangular spot with a curved outer side reaching to the costa, and beyond which on the costa are two equidistant brown spots. Fringe pure white. Hind wings and their fringes pure white. Abdomen white, head wanting in the single specimen before me, which was taken in Nevada by the late Mr. H. K. Morrison.

I name this species for Mr. Charles Fish, of Brunswick, Me., who did such excellent work on our "feather wings" some years ago.

Alucita elliottii, n. sp.

Expanse of wings, from 23 to 25 mm. Head pale yellow (?). Thorax and fore wings pure white, the latter with a brown point before the cleft, an elongated brown spot on the costa over the base of the cleft, and a few brown atoms along the basal third of the fold. Hind wings and all the fringes pure white.

This insect was received from the late Mr. Elliott, who bred it at his home in New York, but on what plant I did not learn.

Alucita eupatorii, Fern.

In 1855, Dr. Asa Fitch, in his first report as Entomologist of New York, published the description of his *Pterophorus cretidactylus*. In 1874, Prof. P. C. Zeller, in his "Lepidoptera der Westkuste Amerika's," described what he supposed to be Fitch's *cretidactylus*, under the generic name *Œdematophorus*, and it was again referred to by Lord Walsingham in his "Pterophoridæ of California and Oregon," who sent specimens to Zeller for determination, and also kindly gave me specimens of this as well as of nearly all of the species he described.

Mr. Charles Fish took up the study of our Pterophoridæ and described several species in this journal, and later purchased the types of Dr. Fitch, when he discovered that the species that had been so well described by Prof. Zeller was not Fitch's species. Finally I purchased Mr. Fish's collection, including not only his own types but also those of Dr. Fitch. I was then able to verify the determination of Mr. Fish, and with him to discover that Lord Walsingham had redescribed the true *cretidactylus*, Fitch, under the name of *Œdematophorus occidentalis*. The *cretidactylus* of Zeller not being the true *cretidactylus* of Fitch, must have a new name, and as it has been bred from *Eupatorium purpureum* by Mr. Elliott, I have given it the specific name of *eupatorii*, as above.

Coriscium cuculipennellum, Hb.

I have received this species from Mr. M. V. Slingerland, of Cornell University, who bred it from ash at Ithaca, N.Y. This European species has not been observed in this country before, and is probably a recent importation. I am under obligations to Lord Walsingham, who compared it with the European species, and determined it specifically for me.

Mr. Slingerland also sent me what I believe to be a new species of *Carposina*, which he bred on currant. He wrote me as follows:—"The egg is laid on or within the berry, and the larva feeds upon the pulp, and sometimes the seeds, confining its work to a single berry. The fruit soon dropped, and the larva left the berry, went into the ground and there pupated. The adults appeared in the spring about the time the currants were turning red. There was only one brood during the season."

The specimens received from Mr. Slingerland were in very poor condition, and I have decided not to describe the species till better specimens are obtained.

The genus *Carposina* has been placed among the Tineids, but it should be placed near *Conchylis* among the Tortricids.

HINTS ON COLLECTING COLEOPTERA DURING THE WINTER.

BY A. FORD, ST. LEONARDS-ON-SEA, SUSSEX, ENGLAND.

During the winter the coleopterist in Britain finds a great deal to do in the way of collecting, as many species are to be met with at this season, which will probably not be found at any other period of the year. One of the principal methods of collecting during the winter is "tuft-cutting", and it is astonishing the number of beetles which pass through the winter in tufts of grass. Those growing in damp places in woods and on the borders of ponds and streams are generally the most productive. They should be cut off close to the roots, then shaken and pulled to pieces over a sheet of paper, which should be very carefully examined, otherwise many of the more minute species will be passed over. If the weather is too severe for this sort of work, the collector should provide himself with a strong canvas bag, into which the tufts can be shaken, and the contents can then be examined at home at his leisure. Moss is also very productive at this season. Vast numbers of beetles may be found hibernating in moss in sheltered situations. This should be examined in the same way as the tufts. Haystacks are also good hunting grounds for the coleopterist. The loose refuse underneath the stack is usually the best part to work. Piles of faggots and logs in woods generally repay the collector for a careful examination. Numbers of beetles are to be found at the roots of grass, especially on sandy banks, where the grass grows in patches. They are always found as close as possible to the roots, and many of them harmonize so well with the ground that it requires a very careful search to discover them. By carefully working a bank of this description one winter I obtained over one hundred species of Coleoptera, including several "rarities". I may add, the bank was only about thirty yards long by two broad. Of course, there are many species of wood-boring beetles to be found in the winter months, as also many others which occur in various species of fungi.

A diligent collector will doubtless add many species, and probably some "rarities" to his collection, if he takes the trouble to look for them during the winter months, and if the foregoing remarks prove of any service to those interested in Coleoptera, I shall be amply repaid for the trouble of writing them.

THE BUTTERFLIES OF GRAND RAPIDS, MICH.

BY ROBT. H. WOLCOTT.

Grand Rapids, Michigan, is situated in the western part of the State, thirty miles from Lake Michigan, in N. lat. 42° 58', in W. long. 85° 40', with an altitude of between 600 and 700 feet. The underlying formation, outcropping in the bed of the river, is the subcarboniferous limestone, and the soil is for the most part a sandy or gravelly loam. The surface of the surrounding country is rolling and diversified by numerous small lakes, with tamarack swamps and peat bogs scattered here and there. The timber is mainly hard wood, but now and then an aged, solitary, pine or a group of younger pines in an out-of-the-way nook reminds us of the fact that we are within the limits of the pine region, while much of the land formerly covered by pine is now occupied by a growth of low oak scrub. The flora is of a mixed character, the locality being just within the pine belt, and the Grand River valley also forming the northern limit of many southern species, such as the papaw, tulip-tree, honey locust, flowering dogwood, tupelo, etc. The mean annual temperature is about 47°, and the average annual rainfall about 36 inches, while the season lasts usually from the middle of April to the fore part of October. The fall of 1890, however, was an unusually late one, and many species were on the wing till the end of October, *Colias philodice* being seen even on the 6th (about a dozen) and on the 20th (one) of November.

The following list of species is the result of ten years' observation, and covers the immediate vicinity of Grand Rapids within a radius of about ten miles :—

1. *Danais archippus.*—Very common. Appearance as follows: The hibernating individuals, from the middle of May to late in June; of the first brood, the larvæ in June, the butterflies from early in July to August 15th; of the second brood, the larvæ late in July and early in August, the butterflies from the end of August to the middle of September; of the third brood, the larvæ in September, the butterflies in October and, after hibernation, again the next May. It is thus three-brooded, and if we disregard the time spent in hibernation, the life of each brood is from two to two and a-half months. It is a very strong flyer, and is often seen hovering about the tops of trees at a considerable distance from the ground, especially near sunset, when seeking a hiding place for the night.

2. *Euptoieta claudia.*—One specimen; Lamberton Lake, in July, 1887.

3. *Argynnis idalia.*—Rare. Taken at Lamberton Lake during the early part of July; is not as strong a flyer as are our other larger Argynnids.

4. *Argynnis cybele.*—Common. From the end of June to the middle of August, frequenting, with the other species of the genus, low, wet ground.

5. *Argynnis aphrodite.*—Common. Flies from about the first week in July to the end of August.

6. *Argynnis alcestis.*—Not rare, but less common than the preceding, from which it may be told in most cases, even on the wing, by its more ruddy colouring.

7. *Argynnis myrina.*—Common. Two broods during the season, the first flying from June 10th to the middle of July, the second from the early part of August through September. A worn specimen was taken in 1890 as late as the 8th of October. Prof. E. A. Strong, once of this place, now of Ypsilanti, Mich., is of the opinion that this species was formerly rather rare.

8. *Argynnis bellona.*—Common. Two-brooded, appearing from May 10th to June 15th, and from July 1st to August 15th.

9. *Melitæa phaeton.*—Common at several localities, from which, however, it never strays. One damp, boggy meadow, where it was formerly very abundant, has been recently drained and part of it cultivated, the result being the extinction of the species at that place. Here were taken all of the three specimens of the var. *superba*, of the capture of which I know. The species flies from the end of June to the latter part of July.

10. *Melitæa harrisii.*—Rare. Taken over low meadows from the middle of May to the middle of June.

11. *Phyciodes nycteis.*—Sometimes quite common. Two-brooded, appearing in June and again in August.

12. *Phyciodes carlota.*—One specimen, the date of which is lost, but taken, I think, early in June; a fresh example.

13. *Phyciodes tharos.*—Common. Two broods; the first form, *morpheus*, flying from June 10th to July 15th; the second, *marcia*, from the early part of August into September. A worn specimen was taken October 8th, 1890.

14. *Grapta interrogationis.* — Common most years, some quite abundant. Flies in early spring up to June 15th; the larvæ of the first brood appear about the end of June, and the butterflies are on the wing from July 10th to the end of the month; a second brood of larvæ is found about that time, and these give butterflies from the 10th to the end of August; the third brood flies late in fall and hibernates. The hibernating butterflies are mostly *fabricii*, while *umbrosa* is more abundant in the summer broods.

15. *Grapta comma* —Common. Flies from early spring to the first of June, again, the form *dryas*, from July 1st to August 15th, while the second and hibernating brood appears late in the fall.

16. *Grapta progne.*—Rather common. Early in spring, again in July and August, and a second brood late in the fall hibernating.

17. *Grapta j-album.*—Not common, though much more so than formerly. Appears early in September, and flies throughout the fall and again in early spring. Our hardiest butterfly, appearing at any time in the winter that the weather is at all favourable. Under date of January 3rd, 1892, I have this note: "Coldest day of winter thus far, the thermometer registering, at 7 a.m., 11°, and though the sun shining brightly all day, the snow only melting in sheltered spots. At 4 p.m. took a *G. j-album* resting, wings erect, on the snow in the middle of the sidewalk of a well-travelled street. Was chilled, but soon revived in the house." All the Graptas, together with *Van. antiopa*, are common early in the spring around trees from which sap is flowing.

18. *Vanessa antiopa.*—Very common. Sometimes becoming a pest by defoliating young elms. Usually three-brooded, the hibernators flying from early spring to the end of May, the larvæ of the first brood appearing early in June, and the butterflies from the 10th of the month to the 20th of July; the larvæ of the second brood are found in the fore part of July, the butterflies during August; of the third brood, the hibernating individuals, the larvæ in September, the butterflies from September 20th onward.

19. *Vanessa milbertii.*—Common; inclined to be local. Three broods, appearing as follows: The hibernating specimens from early in spring to June 15th; of the first brood, the larvæ during the latter part of May and early in June, the butterflies from the end of June to July 15th; the larvæ of the second brood in July, the butterflies during

August; the larvæ of the third or hibernating brood during the latter part of August, the first butterflies about September 20th. I have noticed in a few instances the construction of a web by colonies of young larvæ.

20. *Pyrameis atalanta.*—Common. Two-brooded. The hibernating individuals are seen from the end of April to the latter part of June; the larvæ of the first brood may be found in June, the butterflies from July 10th to August 15th; the larvæ of the second brood during August, the butterflies from the 15th of September.

21. *Pyrameis huntera.*—Common. Two-brooded, flying in the latter part of June and in July, and again in September and October, being then most abundant in clover fields. Hibernating specimens occur, no doubt, early in spring, but I have no record of observations at that time.

22. *Pyrameis cardui.*—Usually common, but some years quite infrequent. In 1884 was very abundant throughout the season, the thistles and burdocks being stripped, and the nettles, mallows, sunflowers and hollyhocks also attacked. It is usually two-brooded, flying from the latter part of May through June; again, from larvæ in June, in July and August; and again, the second brood of the year, from the second week in September onward.

23. *Limenitis ursula.*—Rather common, though formerly rare. Two-brooded, flying during June and early July and again in the latter part of August. It is very much attached to certain localities, and in one door yard for several years it has never failed to appear, at any time during its season, one having to wait but a few minutes to see one or more. It likes to fly along paths in woods and, like *disippus* and the species of *Pyrameis*, *Grapta* and *Vanessa*, has the bad taste to frequent heaps of decaying animal and vegetable refuse.

24. *Limenitis disippus.*—Common. Two-brooded. The first brood flies during June, the second from August 15th through September, one being seen on one occasion on the 8th of October. It frequents especially willow bushes lining the banks of streams.

25. *Apatura clyton.*—One specimen of the form *proserpina* taken by Mr. L. S. Livingston, a former local collector, a few miles east of the city, on the 15th of July, 1885. I am also informed by Prof. E. A. Strong that two or three were taken near the city some years ago.

26. *Neonympha canthus.*—Common during July, frequenting low grounds and swampy meadows.

27. *Neonympha eurytris.*—Common. In June in open woods.

28. *Neonympha mitchelli.*—July 1st, 1885, three years before the species was described, I found it rather common near South Grand Rapids in company with *canthus*, but had neither specimens nor authorities from which to pronounce upon its newness. Have found it quite common at the same locality, a bog some two acres in extent, every year since, from the 1st to the 15th of July. It is readily told on the wing by its dark colour, small size, and weak flight; but owing to its fragility and its habit of flitting low amongst grass and weeds, perfect specimens in any number are difficult to obtain.

29. *Satyrus alope.*—Formerly found here, as I learn from older collectors, but disappeared several years ago.

30. *Satyrus nephele.*—This form is now common in July at two or three localities—low, wet meadows—and specimens are found of the var. *olympus* and others approaching var. *nephele.*

31. *Libythea bachmani.*—One specimen taken in August, 1883, by Mr. C. S. Osborne, a local collector, and another by myself in 1887. August 21, 1885, Mr. L. S. Livingston found a nearly full-grown larva of this species beneath a hackberry tree at the same locality at which the butterflies were captured, and at which the *Apatura clyton* was taken.

32. *Calephelis borealis.*—Taken in July at two or three localities, but only at all common in two low, wet, grassy areas near Lamberton Lake, each less than an acre in extent.

33. *Thecla acadica.*—Common in July, frequenting especially the flowers of butterfly-weed and New Jersey tea.

34. *Thecla edwardsii.*—Rather common, in company with the next, late in June and early in July, on the leaves of low scrub oaks.

35. *Thecla calanus.*—Quite common, and like the preceding, has a curious habit when resting on a leaf of rubbing the upper surfaces of its wings together, giving the tails an upward and downward motion.

36. *Thecla strigosa.*—Rare. July, on the butterfly-weed and New Jersey tea.

37. *Thecla niphon (?)*—In my notes under the date of May 2, 1885, I have this observation: "A *Thecla (Niphon ?)* was seen but was unable to capture it." This could have been none of the other species named, and from the date and our being in a pine region, am inclined to think it this species.

38. *Thecla titus.*—Common. Appearing about the middle of July and flying a month or so, frequenting particularly the butterfly-weed.

39. *Chrysophanus thoe.*—Common, especially in tracts of blue flag from June 10th to the 1st of July, and from August 15th to the middle of September.

40. *Chrysophanus epixanthe.*—Very common at Lamberton Lake, flying over tracts of shrubby cinquefoil *(Potentilla fruticosa).* I have taken it from June 10th to September 19th, and it is common at all times between, though I think there are two broods in reality.

41. *Chrysophanus hypophlœas.*—Common. Flies from May 10th to June 15th, from July 15th to August 15th, and again from September 20th to October 9th, when I have seen worn specimens. It is thus apparently three-brooded, but I believe that of the larvæ from the summer brood some mature and give imagos in the fall, while others go over to spring, and that it is really two-brooded.

42. *Lycæna lygdamus.*—Rare. Late in April and early in May along muddy cow-paths. Very local.

43. *Lycæna pseudargiolus.*—Form *violacea* is not common, appearing in April and early May, while *neglecta* is a common form from June 10th to the latter part of August, and seems in some specimens to approach var. *pseudargiolus.*

44. *Lycæna comyntas.*—Common in May on willow blossoms. Again found from July 15th to August 15th, delighting in wet, muddy places in woods. In 1890, fresh specimens were taken again September 20th, but I believe these were disclosed from chrysalides which should have gone over till the next spring.

45. *Pieris protodice.*—Very common in fall from August 10th to the end of September, but the spring form, *vernalis*, is rather rare, appearing from the end of April to the middle of June.

46. *Pieris oleracea.*—Not common. Low ground; in May and again in July and August.

47. *Pieris rapæ.*—Very common. Several broods, appearing continually throughout the season. The earliest of my dates is April 7th, the latest October 13th. The species was here when I began collecting in 1883 and I have taken it ever since. Am unable to give the date of its first appearance.

48. *Meganostoma cæsonia.*—Formerly found here, I am told, but rare.

49. *Colias eurytheme.*—Once seen, July 20th, 1886.

50. *Colias philodice.*—Very common and producing about four broods in a season, its appearance some seasons being nearly continuous from the first of May to the end of October, and in 1890 seen November 20th. Occasionally in spring a form resembling *anthyale* is seen, expanding but 1.5 inches. Var. *alba* is more abundant in the late summer broods. A third variety occurs which I have nowhere found described, but which is distinct from any variety given in Smith's List, and seems to me to merit a varietal name.

Colias philodice, var. *luteitincta*, nov. var.—Differs from the normal *philodice* in the possession of an orange shade upon the primaries extending from the middle of the posterior margin to the median vein, shading off in all directions into the yellow ground colour, and occupying exactly the position of the orange patch in *Col. eurytheme*, var. *ariadne*. The secondaries also in most specimens show an orange flush in the central portion. I first met this form in company with *eurytheme* and *philodice* in August, 1885, at Batavia, Ills., and supposed the specimens to be hybrids. But have since taken it at different times at Grand Rapids, where *eurytheme* has been seen but once, and have collected in all about a dozen specimens, one of them a female. I find the colouring very constant and sufficiently marked to distinguish the form even when on the wing. Have recently seen a specimen in a collection at Lansing, Mich. Edwards figures an orange variety and suggests the possibility of its being a hybrid between the two species, *eurytheme* and *philodice;* it is not like this and appears much more likely to be, as suggested, a hybrid.

51. *Terias lisa.*—Rare. One specimen taken east of the Michigan Soldiers' Home, August 10, 1891.

52. *Papilio ajax.*—Formerly rare, but has been becoming constantly more common with the spread of the papaw, upon which it feeds, till now it is very common in the southern part of the country and quite so at Grand Rapids, especially in the vicinity of its food-plant. Vars. *telamonides* and *walshii* fly from the early part of May to the latter part of June, and *marcellus* from the end of July to the end of September.

53. *Papilio turnus.*—Common from the end of May to the early part of July, congregating about wet places in roads, etc. Var. *glaucus* is rare. Two specimens have been taken on the wing and one reared from a larva collected on cultivated cherry.

54. *Papilio cresphontes.*—Not uncommon in June.

55. *Papilio asterias.*—Rather common. Two-brooded, the first being on the wing from the end of May to the first of July, the second during August and fore part of September.

56. *Papilio troilus.*—Our most common *Papilio.* Two-brooded, flying from the middle of May to the end of June, and from the beginning of August to September. In one case a battered specimen was taken September 25th.

57. *Ancyloxypha numitor.*—Common. One brood in June and another in August. Flies in low, wet meadows.

58. *Thymelicus poweshiek.*—Common at Lamberton Lake in July. In flight and habits generally much like the preceding.

59. *Pamphila hobomok.*—Common. June. More abundant at certain localities, and, like all the species of *Pamphila*, seems to prefer low, swampy tracts and wet meadows. Several specimens of the var. *pocohontas* have been taken.

60. *Pamphila sassacus.*—Rather common in June in company with *mystic* and *peckius.*

61. *Pamphila leonardus.*—Rare. Flies from August 10th to the end of the month.

62. *Pamphila egeremet.*—Not common. July.

63. *Pamphila peckius.*—Very common. Apparently two-brooded, one brood appearing early in June, the other during the first week in August.

64. *Pamphila mystic.*—Common. From early June to the middle of July.

65. *Pamphila cernes.*—Very common. Two broods during a season, one flying from June 10th to July 15th, the other from August 15th to the end of September. In 1890, took a fresh female on October 4th. A female taken in July, 1892, differs from the normal form in an almost entire lack of fulvous in the cell.

66. *Pamphila manataaqua.*—One specimen, July 14th, 1892.

67. *Pamphila metacomet.*—Rather rare. Flies during the latter part of July.

68. *Pamphila bimacula.*—One female taken July 20th, 1892.

69. *Pamphila pontiac.*—Common in July. Have a male specimen in which the under surface of one secondary is suffused with brownish so as to completely obscure the normal pattern of the wing.

70. *Pamphila dion.*—Common in July, last year, at one locality in company with *pontiac*, and upon the wing much resembling that species.

The range is much wider than given in French, as I have specimens from Western New York.

71. *Pamphila delaware.*—Usually not very common, but last year was quite abundant at two or three localities. Flies in July.

72. *Nisoniades brizo.*—Not common. Appears early in May.

73. *Nisoniades icelus.*—Rather common from the end of May, through June, and once taken, a battered example, as late as July 14th.

74. *Nisoniades lucilius.*—Found, but not common, in June.

75. *Nisoniades persius.*—Not common. Flies about the end of May.

76. *Nisoniades juvenalis.*—Common in June. The species of *Nisoniades* seem to appear in spring about in this order: first *brizo*, then *icelus*, *persius* and *juvenalis*, and lastly *lucilius*. They all delight in recent clearings in the woods and in tracts of bushes, stumps and brush-heaps.

77. *Pholisora catullus.*—Common. Two-brooded, appearing in June and again in September, the second brood being especially common around door yards and waste places where grow different species of *Amarantus*, especially *A. albus*. The larvæ are also found on *Chenopodium album*.

78. *Eudamus pylades.*—Quite common. Seen in spring from the middle of May to the middle of June, preferring open woods.

79. *Eudamus tityrus.*—Common. From the end of May to the middle of July, but seems to prefer a solitary life and more than two or three are never seen at any one time.

From this list it appears that 79 species of butterflies have been taken at this locality; one or two remarks, perhaps, would be of value concerning certain ones. As to the Papilios, from information received from Prof. E. A. Strong, who began to collect at this place some thirty years ago, it appears that *troilus* has constantly grown more common, and *asterias* and *turnus* less so; *ajax* was once extremely rare, and the first *cresphontes* was not taken till some years after Mr. Strong came here, though he is unable to give me the exact date. *Pieris rapæ* has, of course, appeared in comparatively recent times, and as it has become more common, Mr. Strong thinks *protodice* has decreased in numbers, while *oleracea* is certainly much less common than it was ten years ago. *Sat. alope*, once taken, has disappeared and *nephele* become common, but not however at the same locality. *Arg. myrina*, *Grapta j-album* and *Lim. ursula* have also grown more common of recent years.

I desire in closing to call attention to one locality near this city which is, it seems to me, a remarkably productive one, and that is the vicinity of Lamberton Lake. Upon one day last summer, July 14th, I observed there 34 species, in a tract less than a mile in length :—*Dan. archippus*, *Arg. aphrodite*, *alcestis*, *myrina*, *bellona*, *Mel. phaeton*, *Phyc. nycteis* (worn), *tharos*, *Grapta comma* var. *dryas*, *progne*, *Van. antiopa*, *Lim. ursula*, *disippus* (worn), *Neon. canthus*, *eurytris*, *Sat. nephele*, *Cal. borealis*, *Thecla acadica*, *edwardsii*, *calanus*, *Chrys. hypophlœas*, *epixanthe*, *Pier. rapæ*, *Col. philodice*, *Pap. asterias* (one), *Thym. poweshiek*, *Pam. peckius*, *cernes*, *pontiac*, *egeremet*, *mystic*, *delaware*, *manataaqua*, and *Nis. icelus* (worn). A very long list, it seems to me, for one day in one locality.

TRYPHON FLAVIFRONS, N. S.

BY REV. THOMAS W. FYLES, F. L. S., SOUTH QUEBEC.

Antennæ, filiform, brown; number of joints, twenty-seven; scape, large, ovate, pale yellow beneath. Eyes naked, large and prominent, dark rosy brown. Clypeus, labrum, mandibles and palpi pale yellow. The lower portions of the epicranium are of the same colour. The occiput is black, smooth and glossy. Mesothorax highly convex, black, sparsely set with short, pale-brown, retrorse hairs. Scutellum elevated. Tegulæ yellow. The under parts of thorax amber-coloured, as are also the legs, with the exception of the tarsi and parts of the tibiæ of the hindmost pair, which are brown.

Wings hyaline. Costal and sub-costal nervures coalesce; stigma large; basal nervure much curved inwardly; the second transverse cubital nervure wanting; third submarginal cell large; second transverse cubital nervure short and straight; recurrent nerves straight and parallel; second discoidal cell rather small.

Abdomen long, flattened, sessile, black above, yellow beneath. Ovipositor black, short and straight, the case set with black bristles beneath.

Length of body, three-tenths of an inch, and of antennæ two-tenths. Expanse of wings, four-tenths. The fly makes its appearance in August.

Described from six specimens obtained from Nematus larvæ that had fed on a species of poplar *(P. nolesti)* imported from Russia, and that had gone into cocoon.

THE SONG OF THYREONOTUS.

BY WILLIAM T. DAVIS, STATEN ISLAND, N. Y.

Mr. Samuel H. Scudder, in the Report of the Ontario Entomological Society for 1892, gives an interesting account of the "Songs of Our Grasshoppers and Crickets," and kindly permits the stridulations of a number of Staten Island insects to be heard mid the general medley. There is, however, an additional songster to be added to this list, as appears from the following.

On the 26th of last June I heard in a moist pasture, on the north shore of the Island, a stridulation that was unknown to me. It much resembled that produced by *Orchelimum vulgare*, with the preliminary zip, zip, omitted. It was a continuous *z e e e*, with an occasional short *ik*, caused by the insect getting its wing-covers ready for action after a period of silence. It was too early for *Orchelimum vulgare* by about a week; at least I have never heard one on the Island before the fourth of July; so in the present instance I made careful search for the musician. In due time I discovered, in a tussock of rank swamp grass, the brown songster perched on a dead leaf, and receiving the evidently welcome rays from the afternoon sun. It was *Thyreonotus pachymerus*, and in the swampy field about me I heard others of its kind, so that this individual was only one of a considerable colony.

A failure to make proper use of his legs (the wings are abortive), resulted in the transfer of Thyreonotus from the tussock to a tin can. At home I made a bowery for him in a larger tin can covered with netting, into which was introduced a branch of the coriaceous leaved post oak, and when the leaves dried, there were innumerable nooks and crannies wherein to hide. Usually, however, the insect did not hide at all, but perched himself on one of the topmost leaves and there waved his antennæ after the manner of all long-horned Orthoptera. Starting with raspberries, he had the rest of the fruits in their season, including watermelon, of which he showed marked appreciation. If I offered him a raspberry, and then gradually drew it away, he would follow in the direction of the departing fruit and would finally eat it from my hand.

As the bowery was kept in my bed room, I had the full benefit of the songs of its occupant, and was often awakened in the night by his sudden, alarm like outburst of melody. He stridulated with unabated zeal to the first of August, when I noticed that his energies were lagging—he

seemed to be much less sprightly. Finally his song, instead of filling the room, was but a faint sound, and I was obliged to place my ear close to the tin can. This was nearing the end, which came either on the tenth or eleventh of September, I cannot say which, for the bowery was not disturbed until its occupant had been missing from the upper leaves for several days.

Once or twice during his captivity he took unnecessary alarm at my well-meant efforts to "fix" the bowery, and whacked his head most insanely against the tin can, being propelled thereto by his muscular hind legs. However, no harm seemed to result from these little fits of nervousness, and he evidently died quietly enough in the end.

I have observed in other kinds of grasshoppers the subsidence in the volume of song as they grew older, which evidently makes it unsafe to take the efforts of a single individual as the standard of the species, especially if the time is late in the fall.

NOTES ON LEUCANIA PSEUDARGYRIA, GUEN.

BY REV. THOMAS W. FYLES, F. L. S., SOUTH QUEBEC.

Full-grown larva.—Length, two inches. Colour greenish-brown above, greenish-grey beneath. Pale dorsal and side lines. Spiracles black. Head and scale on second segment light reddish-brown; jaws darker brown. This description agrees with that given by Mr. Caulfield in Vol. XIII. of the CANADIAN ENTOMOLOGIST, page 132.

The larvæ, like those of *Arzama obliquata*, feed in the stems of *Typha latifolia*. The two species may sometimes be found in the same plant. They are plentiful in the swampy ground at the foot of Mount Royal, Montreal. Both sometimes become the prey of the maggots of *Chætopsis ænea*, Wied.

Pupa.—Length, one inch and a-quarter. Colour light brick-red. Forepart rounded abruptly and terminating in a beak-like projection, resembles the head of a bird. Thoracic portion of case curves backward on either side to a point. Wing cases large.

My specimens underwent the pupal change amongst the accumulated frass in their tunnels; but doubtless the larvæ sometimes leave the food-plant and seek hibernacula elsewhere, as do those of *Arzama obliquata*. (See Mr. Caulfield's notes referred to above.)

TWO NEW CYNIPIDS FROM WASHINGTON STATE.

BY C. P. GILLETTE, FORT COLLINS, COLO.

In February of last year I received a box of galls from Mr. Trevor Kincaid, of Olympia, Washington, for identification. The galls were taken from *Rubus Nutkanus*, and the flies reared from them early in the following March prove to be a new species, which I take pleasure in dedicating to Mr. Kincaid.

Diastrophus kincaidii, n. sp.

Gall.—Either of the two galls in my possession measure almost exactly 1¼ inches in length by three-fifths of an inch in greatest diameter, and are upon twigs that do not exceed 2½ mm. in diameter. The galls are abrupt enlargements of the twigs, and they are literally filled with larval cells. The portion of the gall-subtance lying outside the cells is quite pithy, but the portion forming the septa between the cells is hard and woody. The surface of the gall is smooth, but is irregularly swollen or lumpy, much as in the gall of *D. nebulosus*.

Gall-fly.—Female. Black; legs, dark rufous; length, 2 to 2½ mm.

Head: face, coarsely striated; frontal carina, smooth and shining and but little elevated (it seems like a ridge made by two depressed lines, one on either side) vertex, genæ and occiput smooth and shining; ocelli, inconspicuous; face, sparsely set with very fine pubescence; mandibles, somewhat rufous at base; antennæ, 13-jointed and black in colour. Thorax: mesonotum, nude, polished; parapsidal grooves distinct; median groove also distinct, but extending only a short distance from scutellum; prothorax, striate; mesothoracic pleuræ, shining, finely aciculate over a portion of the surface; scutellum rugose, bifoveate. Abdomen, entirely black; petiole, fluted, second segment occupying one-half of the dorsum. Wings, 3 mm. long; hyaline; 1st and 2nd transverse nervures, quite black, but not very heavy; areolet, small.

The male differs from the female in being only one and three-fourths mm. long, having antennæ 14-jointed, and having the abdomen smaller.

Described from 25 females and 14 males bred from the galls.

Synergus garryana, n. sp.

Female. General colour rufous, with tips of mandibles, compound eyes, vertex between ocelli, occiput, lower half of mesopleuræ, metathorax, pedicel of abdomen and two blotches on second abdominal segment, one next the petiole and one just beyond the middle of the dorsum, black.

Head; face entirely yellowish-rufous, coarsely striated and sparsely set with short hairs; vertex rugose-punctate; antennæ 14-jointed, and in colour like the face, a little infuscate at the tip. Thorax above a little darker rufous than the face, transversely rugose; parapsidal grooves narrow and rather indistinct, but extending to the collar; no median groove; parallel lines extending back from the collar, short and rather indistinct, sparsely set with short recumbent hairs; scutellum coarsely rugose, the foveæ oblique and shining black at the bottom; mesothoracic pleuræ coarsely aciculate; in two specimens the lower half only is black, and in two others, a little smaller, the entire pleuræ are black. Abdomen: petiole coarsely striated; second segment very smooth and shining, and finely punctured on outer third. Legs, including coxæ, uniform light yellow, except the tarsi of the third pair and the tips of the last tarsus in the others, which are black. Wings hyaline, nervures light, areolet obsolete. Length, 2½ to 3 mm.

Male. The male differs from the female as follows: Length, 2¼ mm.; vertex above antennæ, except a narrow orbital line, black; antennæ, 15-jointed; thorax, entirely black; abdomen, black, except the tip of the second segment, which is yellowish, and the entire tibiæ of the pair of legs are blackish.

The above descriptions are made from four females and five males which issued from the galls between March 1st and 10th, 1893.

The galls from which this very pretty Synergus was reared resemble very closely those of *Holcaspis monticola*, Gill, MS., the description of which is already in the hands of the printer for publication. The galls were collected by Mr. Trevor Kincaid, of Olympia, Washington, from twigs of *Quercus garryana*.

WHICH SIDE OF THE TREE DOES PHLŒOTRIBUS LIMINARIS ATTACK?

BY F. M. WEBSTER.

Recently, while studying the habits of this beetle in the peach orchards of Catawba Island, on the south shore of Lake Erie, I was surprised to observe that the fall attack had invariably been made on the east or south-east side—which is here the land side of the trees—and old trees, where the bark of the trunks was very rough, were more seriously affected. On mentioning the fact of this apparent discrimination in point of attack to my friend Dr. D. S. Kellicott, he recalled that the same phenomenon occurred about Buffalo, New York.

Here in Ohio, in every case where the writer has observed it, the adults only have been found, wintering in burrows or chambers in the bark clearly excavated by themselves after becoming fully developed and not during larval stage.

On February 10, I took from a peach tree in Eastern Arkansas, adults, pupæ and what I presumed to be larvæ of this species, from all sides of the tree, which, by the way, was rather a young one with bark comparatively little roughened. This tree stood just above high water mark, on the eastern foot of Crawley's Ridge, which marks the western boundary of the swamp or overflowed country to the west of the Mississippi River. There was here, certainly, no partiality shown for any particular side of the tree. Are the beetles in Northern Ohio and Western New York driven to the discrimination previously noted by the lake winds, at the time they burrow into the bark in the fall, and has such selection in point of attack been observed elsewhere, except near and to the south of the Great Lakes?

CORRESPONDENCE.

TRYPETA, CLISIOCAMPA AND AMMALO.

The January and February numbers of the CANADIAN ENTOMOLOGIST just to hand suggest a few remarks. Prof. Townsend gives a most interesting account of the *Bigelovia* Trypetid, and although I had described the imago as well as the gall in Ent. Mo. Mag. (Dec., 1890, p. 324), most of what he writes is new. The eyes, as Prof. Townsend surmises, are green in life. The variety from Johnson's Basin seems to have the character of my var. *disrupta*. The hymenopterous parasite mentioned on page 52 may perhaps be a *Torymus*, identical with one I bred at West Cliff. I also bred from the galls a new *Eurytoma* (*E. bigeloviæ*, Ashm.) and a weevil, *Anthonomus canus*, besides the Cecid, which I described as *Cecidomyia bigeloviæ*. At West Cliff, Colo., a *Clisiocampa* is very common, which, according to Mr. Dyar, must be referred to *C. fragilis*, Stretch. I had always called it *californica*, following Dr. Packard's opinion. An account of this insect will be found in the 4th Rept. of the Colo. Biol. Assoc., where the distinctness of certain of the larvæ from *californica* is alluded to. *Populus* and *Salix* may be added to the list of food-plants. I also found larvæ on *Ribes aureum*. I found the eggs on willow branches in batches; colour pale greyish, shape elongate, egg-shells iridescent within. *Ammophila robusta* is an enemy of the larva, but I did not notice any parasites. On page 27 Mr. Dyar refers to *Ammalo helops*. This gets nearer to the U. S. than Surinam, at all events, since Möschler in 1886 recorded it from Jamaica. With reference to the foot note on page 52, it is only fair to state that the trypetid nature of the *Bigelovia* galls was first discovered at the Department of Agriculture, Washington. This was before I had bred the imago.

Feb. 19, 1893. T. D. A. COCKERELL.

Mailed April 11th.

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NEW SPECIES OF FOSSORIAL HYMENOPTERA.

BY WM. J. FOX, PHILADELPHIA.

MYZINE THORACICA.

♀.—Clypeus strongly and closely punctured, carinated or angular down the middle; front with large, coarse punctures, which become sparser on the vertex and cheeks; the ocelli deeply pitted, the hind pair almost hidden; prothorax, mesopleuræ, dorsulum and scutellum with large, separated punctures, those on the dorsulum by far the largest and sparest; metathorax above and behind entirely smooth, the metapleuræ with oblique striations; legs, especially the tibiæ, coarsely punctured, the outer side of the medial and hind tibiæ covered with strong, short bristles, and in addition with a row of stout, short spines on the outer edge, the medial and hind tarsi with long bristles and spines; anterior tarsi with the spines stout, the longest equalling the length of the first joint of that tarsus; wings flavo-hyaline, somewhat fuscous apically, the nervures testaceous; abdomen with a beautiful iridescent sheen dorsally, with fine rather close punctures, the first segment and base of the following three impunctate; on the apical portion of segments 1–3 the punctures are sparse and stronger, those on the fifth segment stronger; ventral segments on apical portion with large punctures or holes, which form on segments 1–4 a transverse row, which is produced forward into an angle medially; last dorsal segment with fine longitudinal striations. Black: mandibles, except apical portion, apex of scape, base of femora beneath, apex of fore tibiæ, the remaining tibiæ above and the tarsi. Rufous: a spot at the extreme side of clypeus, a transverse mark on front behind antennæ, interrupted medially, which extends up along the inner orbits and coalesces with the mark on the vertex—this latter extends down on the cheeks; prothorax above, except two elongate, transverse marks, two large spots on mesopleuræ, middle and outer lobes of the dorsulum in part, tegulæ, scutellum, post scutellum, a large spot in middle of metanotum, a much larger one on each side of the posterior face, which extends around on the sides; the

femora and tibiæ in part, a transverse band on dorsal segments 1–5 of abdomen, all of which except the first are narrowed medially, the first and second slightly separated, that on the third segment somewhat squarely emarginate behind, and ventral segments 2–4 with a large spot, those on the second segment longitudinal, the others transverse; mandibles and labrum fringed with testaceous hairs; head, thorax, legs and abdomen beneath with long, pale hair. Length, 18–20 mm.

So. Illinois *(Chas. Robertson)*. One specimen has the markings on the abdomen narrower, the band on the second segment widely divided in the middle, the third ventral segment immaculate, and the front with a longitudinal medial yellow line. Allied to *sexcincta* and *caroliniana*. From the first mentioned it is distinguished by the entirely smooth metathorax, the richer livery; from the latter by the stronger and closer punctuation of the front and ventral portion of the abdomen and larger size. It may, however, prove to be but a variety of *sexcincta*.

POMPILUS RELATIVUS.

♀.—Anterior margin of clypeus distinctly but not strongly incurved; ront with the impressed line obliterated in the middle, but very strong behind the antennæ and before the ocelli; posterior margin of prothorax subangular: metathorax rounded behind, upper surface with a rather strong, longitudinal, impressed line, which terminates at base of posterior face, the latter depressed; tibiæ and tarsi strongly spinose; tarsal claws toothed at the base; longest spur of hind tibiæ more than half as long as the first joint of hind tarsi; wings deep blackish violaceous, the apical margins even darker, third submarginal cell triangular, the second and third cubital transverse veins very contiguous at the top, second recurrent nervure sinuous, received by the third submarginal cell at about the middle; ventral abdominal segments with a few erect hairs, which are most dense and prominent on apical segment. Black, with a very slight bluish reflection, which is most obvious on the abdomen; legs and antennæ entirely black; head and anterior coxæ with numerous long, black hairs, the prothorax and dorsulum also with a very few hairs. Length, 18 mm.

Two specimens. Ocean County, N.J. *(Prof. J. B. Smith)*; So. Illinois *(Chas. Robertson)*. Related to *philadelphicus*, *æthiops* and *maurus*. The clypeus is much less incurved than in either of the first

two species, and the third submarginal cell differently shaped. From *maurus* it differs by having the tarsal claws toothed, instead of cleft. Its position is between *æthiops* and *maurus*.

POMPILUS POSTERUS.

♀.—Anterior margin of clypeus very slightly incurved; frontal impression distinct; posterior margin of prothorax bowed; metathorax not impressed above; tibiæ and tarsi very strongly spinose, the longest of those on the fore tarsi almost equalling the first joint of that tarsus in length; tarsal claws cleft; longest spur of hind tibiæ much more than two-thirds as long as the first joint of hind tarsi; wings hyaline, the apical margin broadly fuscous, nervures black; third submarginal cell narrowed about one half at the top, the second recurrent nervure received by it a little beyond the middle. Black: head, thorax, legs and first abdominal segment clothed with silvery pile which has somewhat the appearance of verdigris; hind femora and tibiæ (the spurs excepted) rufous, posterior margin of prothorax narrowly whitish; head with rather sparse, pale hair. Length, 7 mm.

♂.—More slender than the female, antennæ shorter and stouter; the tibial spurs, transverse band at base of third dorsal segment, and spot at apex of abdomen above, white. Length, 7 mm.

Camden County, N. J. (July); So. Florida (*Chas. Robertson*). Allied to *biguttatus*, from which it differs in the colour of the hind legs, the stronger armature of the legs and the greater length of the hind tibial spur.

PLANICEPS CALCARATUS.

♂.—Anterior margin of clypeus rounded; front strongly impressed on lower portion; anterior ocelli deeply pitted; antennæ reaching much beyond the tegulæ, the flagellum slightly tapering to the apex; hind margin of prothorax formed into a very slight angle medially; metathorax above with exceedingly fine punctures, with longitudinal, medial, impressed line; tibiæ with distinct, though not strong, spines, the tarsi scarcely or not at all spined; longest spur of hind tibiæ as long as the first joint of hind tarsi; wings sub-hyaline, iridescent, nervures fuscous, second recurrent nervure uniting with the second transverse cubital vein; black;

tibial spurs white; head and sides of thorax sparsely clothed with silvery-sericeous pile. Length, 6 mm.

So. Florida *(Chas. Robertson)*. Distinct from our only other known species, *feralis*, by the longer antennæ and hind tibial spurs, and by the white calcaria.

GORYTES DENTATUS.

♂.—Head not as broad as the thorax; ocellar region slightly raised, the ocelli forming a very low triangle; front with large, shallow, scattered punctures, the longitudinal impressed line strong; inner eye-margins slightly though distinctly converging towards the clypeus; scape but little if anything longer than the clypeus, is long in the middle, third antennal joint distinctly longer than any of the following, except the last, to which it is about equal; joints 10–12 emarginate beneath, the twelfth joint but slightly so; clypeus convex, with a few scattered, indistinct punctures, its anterior margin distinctly incurved. Thorax with strong, separated punctures, sparsest on the scutellum; in addition to the carina which runs from each shoulder tubercle around the fore edge of meso-sternum, there is behind it a transverse carina or ridge, which terminates in a stout tooth at the extreme side; enclosed space on metanotum well-marked, triangular, its sides somewhat incurved, on the basal portion it is longitudinally strongly striated, while on the apical narrow portion it is transversely striated, at the apex of the enclosure there is a strong pit; four posterior tibiæ and tarsi tolerably well furnished with spines; wings hyaline, a fuscous cloud completely fills the marginal, second and third submarginal, and the apical portion of the third discoidal cells; there is also a slight spot at apex of median and sub-median cells, stigma and costal nervure fulvous, the other nervures black. Abdomen with tolerably strong, separated punctures, strongest and more scattered ventrally, first segment at apex nearly as wide as the second, sessile with it, the second segment transversely swollen near the base, so that when viewed from the side the first and second segments are separated by a deep suture. Entirely bright ferruginous; tips of mandibles black; clypeus, front and face on sides, scape beneath, transverse line on collar, shoulder-tubercles, anterior portion of mesopleuræ, scutellum, a spot on four anterior tibiæ in front, first joint of medial tarsi at base, and apical margins of dorsal abdominal segments 1–3, pale yellow; the fascia on segments 2 and 3 narrowest

broadened at extreme sides; a broad fascia on second ventral segment and two large spots on the third, also yellowish ; clypeus sparsely clothed with pale hairs. Length, 10 mm.

Grand Canon, Arizona, "70 miles North of Flagstaff." *(C. H. Tyler Townsend).* Not closely related to any of our species. It comes nearest to *G. spilopterus* and *tricolor*, but the sculpture is finer and the abdomen differently shaped. It differs from the ♂ of *tricolor* in the dentate mesosternum ; the ♀ of *spilopterus* is as yet unknown, but *dentatus* differs too greatly to consider it the ♂ of that species.

MIMESA MACULIPES.

♂.—Anterior margin of clypeus subtruncate, entire ; front with very fine, close punctures, which become sparse on the vertex, and strongly impressed medially ; ocelli very prominent, placed in a triangle, on each side of the hind pair there is a strong depression ; antennæ rather long, the flagellum clavate ; first joint of flagellum about one-quarter longer than the second ; dorsulum with very fine punctures, almost impunctate; suture between dorsulum and scutellum wide ; scutellum impunctate, slightly impressed medially ; metathorax very strongly rugose ; the enclosed space at base of metanotum with numerous, somewhat oblique ridges ; petiole in length distinctly shorter than the hind femora, almost straight, the upper surface with two widely separated furrows, on the sides the petiole is broadly channelled ; remainder of abdomen impunctate, last dorsal segment smooth ; black, the abdomen entirely so ; flagellum beneath rufous ; apex of four anterior femora, the tibiæ and tarsi, pale testaceous ; hind tibiæ, except base and apex, black ; face and clypeus with bright silvery pubescence, wings hyaline, nervures and stigma black. Length, 10 mm.

So. Florida *(Chas. Robertson).* Because of both recurrent nervures received by the second submarginal cell, I have placed this in *Mimesa*. It differs from all our species of that genus (?) by the entirely black abdomen. In my opinion *Mimesa* is but a section of *Psen*.

SYNOPSIS OF THE ASILID GENERA MALLOPHORA AND NICOCLES.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

With the exceptions of *Mallophora ardens*, Macq., and *M. fulviventris*, Macq., neither of which have been identified, the following table contains all the species belonging to this genus at present known to occur in America north of Mexico. Three species are known to me to inhabit Southern California: *fautrix*, O. S., originally described from Mexico; *Guildiana*, also found in Montana, Kansas and North Carolina; and a new species described below:—

1. Pile of abdomen light coloured, none black 2
   Pile of abdomen light coloured, many on the fourth or following segments black 5
   Pile of abdomen wholly black ..... *nigra*, Will.
2. Femora, except the extreme apex, black 3
   Femora largely or wholly red 4
3. Thorax destitute of black pile, first posterior cell broadly open ..... *megachile*, n. sp.
   Thorax with black pile, first posterior cell closed .. *clausicella*, Macq.
4. Femora wholly red, pile of legs largely black ..... *fautrix*, O. S.
   Femora marked with a distinct black spot on each, pile of legs light yellow ..... *Guildiana*, Will.
5. Pile of venter light coloured 6
   Pile of venter black ..... *orcina*, Wied.
6. Species not exceeding 15 mm. in length ..... *laphroides*, Wied.
   Species exceeding 20 mm. in length ..... *bomboides*, Wied.

Mallophora megachile, n. sp., ♂ ♀. Black, tibiæ and extreme apices of the four anterior femora yellow. Pile of entire body grayish-white, more yellow on the tibiæ, a few black ones on the antennæ, front, tips of posterior femora above, and many on apices of the posterior tibiæ and on all the tarsi; that on the hypopygium of the male rather dense, white, appressed and parted in the middle. A few black bristles at apex of each of the four posterior femora above, also on the under side of the posterior femora and on the posterior tibiæ. Halteres brown. Wings grayish-hyaline, costal and marginal cells darker; first posterior cell broadly open; apices of the fourth and of the three following veins nearly colourless. Antennal style less than three-fourths as long as the third joint.

Length, 12 mm. Los Angeles County, Cal. Four males and one female.

The following table contains all the species of *Nicocles* known to occur in America north of Mexico; of these, *rufus* and *scitulus* may belong to *Blacodes*:—

1. Third and fourth abdominal segments wholly black.....3
   Third and fourth segments largely or wholly red.....2
2. Body red, a black spot on the second abdominal segment.....*rufus*, Will.
   Body black, abdominal segments three to six largely red.....*abdominalis*, Will.
3. Wings hyaline, a brown cloud at base of each submarginal, posterior and of the discal cell.....*scitulus*, Will.
   Wings marked with brown in other places than these.....4
4. Antennal style one-half as long as the third joint.....5
   Antennal style only one-fourth as long as the slender third joint; eastern species.....*pictus*, Lw.
5. Fifth abdominal segment in the male more than three times as wide as long.....6
   Fifth segment less than three times as wide as long; California species.....7
6. Inhabits the Atlantic States.....*politus*, Say.
   Inhabits California.....*dives*, Lw.
7. Brown spot at tip of wing not crossing the first and second posterior cells; posterior tibiæ and tarsi of the male densely silvery within.....*argentatus*, n. sp.
   Brown spot at tip of wing crosses the first and second posterior cells; posterior tibiæ and tarsi of the male not silvery.....*æmulator*, Lw.

Nicocles argentatus, n. sp., ♂. Black, the tibiæ and apex of the sixth and sometimes of the fifth abdominal segment red. Front grayish-brown pollinose, face nearly flat, white pollinose and sparse whitish pilose, mystax on oral margin consisting of a few long yellowish hairs interspersed among about fourteen stout yellow bristles; pile of palpi and of occiput white, bristles of the latter yellowish. First joint of antennæ

slightly longer than the second, the third one and three-fourth times as long as the first two taken together, of nearly an equal width, the style nearly half as long as the third joint. Thorax marked with a broad median black stripe not extending on the posterior fourth, and on each side of it is a large brown pollinose spot divided by the suture and bounded in front by a black spot, also a brown spot on the humeri, elsewhere the pollen is grayish-white, the pile very sparse, white, the bristles brown; pleura brown pollinose in front, grayish-white pollinose behind, the fan-like row of hairs in front of the halteres white. Scutellum brown pollinose, a black spot at the base each side; bearing two brown bristles. Abdomen smooth, sparse grayish-black pollinose, that at base and sides of segments two to four gray, the fifth and sixth segments wholly silvery pollinose; second segment longer than wide, the others wider than long, the fifth being two and a-half times as wide as long; venter gray pollinose and with a median brown pollinose stripe, its pile and that of the legs white, the bristles of the latter white and yellowish; posterior tibiæ within, and the underside of their tarsi, densely silvery-white pollinose and pubescent. Wings hyaline, an indefinite pale brown spot extends from the tip of the auxiliary vein to the base of the fifth posterior cell, darkest in the marginal and interrupted in the first submarginal cell; a second brown spot covers the veins at bases of the first, second and third posterior cells; a scarcely apparent brown spot at base of second submarginal cell, and a large one filling apices of the marginal, first and second submarginal and of the first posterior cell, extending from one-half to three-fourths the distance from the tip to the base of the second submarginal cell, and sometimes connected with the first mentioned brown spot by a brown streak extending through the middle of the marginal cell; all posterior cells open, the anal cell closed.

♀.—Same as the ♂, except that the apices of the fifth and sixth abdominal segments are never red, the pollen covering these segments is never silvery, and the posterior tibiæ and tarsi are destitute of silvery pollen and pubescence.

Length, 8 to 10 mm. Los Angeles and San Bernardino Counties, Cal. Nine males and eight females in April.

DESCRIPTIONS OF CERTAIN NEW FORMS OF LEPIDOPTERA.

BY B. NEUMOEGEN AND HARRISON G. DYAR.

Family LAGOIDÆ.

Vein 1a of primaries present; median, 4-branched; vein 8 of secondaries arising from the subcostal, more than half the length of cell from base; ♂ antennæ pectinated to the tip.

Synopsis of genera :—

Antennæ long; body parts robust.

Veins 3 and 4 of secondaries stalked.. .... *Carama*.

Veins 3 and 4 separate, arising from the median..... *Lagoa*.

Antennæ very short; body more slender..... *Dalcerides*.

Genus DALCERIDES, *n. gen.*

Head very small, but with large eyes; palpi slender, antennæ *very* short, hardly as long as the thorax, finely bipectinated. Vein 1 of primaries free, unbranched; 1a present; median vein 4-branched, vein 2 arising beyond the middle, veins 3–5 from near together; cell broad, closed, with false discal vein; 6 from the middle of the retracted upper half of the cross vein, a small rounded accessory cell; 7–8 on a stalk from the pointed end of the accessory cell; 9 from the same point; 10 apparently absent; 11 from top of accessory cell, appearing to join 12, which is free from base. The secondaries have two internal veins; veins 2-6 as on primaries; 7 a continuation of the subcostal; 8 from subcostal on middle of cell, not diverging till end of cell; a discal false vein runs to the angulation of the cross vein between the origins of veins 5 and 6.

Type, *Artaxa ingenita*, Hy. Edw.

Family NOTODONTIDÆ.

Median vein of primaries 3-branched; 8 of secondaries from base, close to subcostal for a large part of its length; veins 3 and 4 not stalked.

Partial synopsis of genera :—

Outer margin of primaries entire.

♂ Antennæ pectinated to the tip, the pectinations as long or longer than their cilia.

Primaries without accessory cell.

Internal margin entire.

Vein 5 of secondaries weak or absent.

Tip of abdomen with a brush-like tuft... *Melalopha*.

Genus MELALOPHA, Hübn (= *Ichthyura*, Hübn.)

M. ALETHE, *n. sp.*

We have before us a ♀ specimen from Truckee, California, which seems to be undescribed. It is possible that we have to do with *M. apicalis*, though the description of Walker does not fit. It is allied to *M. multnoma*, Dyar, and *M. brucei*, Hy. Edw.

Colour, obscure gray or drab, with the usual deep brown thoracic mark. Fore wings slightly purplish ("ecru drab," Ridgway's nomenclature of colours, plate III., fig. 21), the lines as in *brucei* and *multnoma*, but white and narrower, more as in *pigra*, powdery, obsolescent, under the lens narrowly broken here and there, the fourth forming a distinct, somewhat S-shaped bend at costa, where it is slightly widened and distinctly white. The wing is very uniform in colour, without the contrasting shades of *brucei* and *multnoma*; there is no subapical rusty patch except the merest trace outside the 4th line, but a moderately distinct deep brown shade overspreads the whole apical portion of the wing from the third line outward, reaching downward to vein 3, and being most strongly marked in the region of the 4th line. It recalls the ornamentation of *M. anachoreta*, Fabr.; but is far from being as distinct as in that species. This shading is present in *M. var. ornata* and *M. brucei* and others, but these have also the shade bordering the 3rd line, so that the resemblance to *anachoreta* is obscured. Subterminal series of interspaceal dots nearly straight, very uniform, and not obscured by the shading.

Hind wings drab (Ridgway, plate, III., fig. 18), immaculate. Expanse, 28 mm.

The following table will serve to separate the North American forms of Melalopha. Omitted names are referred to the synonymy:—

Lines not anastomosing, the 3rd running free from internal margin to costa.

Only the 4th line present (?)..... *apicalis*, Walk.
Lines all present.
Size large, basal line straight.
Colour dark, with black subapical patch. *albosigma*, Fitch.
Colour paler, patch brown..... *var. specifica*, Dyar.
Size smaller, basal line angulated and curved.
Of uniform tint, subapical rusty patch very obscure..... *alethe*, Neum. and Dyar.

Of contrasting shades with distinct subapical rusty patch.
Colour very dark, obscured..... *multnoma*, Dyar.
Colour pale, shades contrasted.... *brucei*, Hy. Edw.

Lines anastomosing, the 2nd and 3rd joining at or about the median vein.

Lines all waved, the basal one both angulated and curved.
Size medium, ornamentation distinct.
Size moderate with the usual thoracic patch.
Colour dark, a waved paler band on secondaries.
Subapical shade rusty red..... *vau.* Fitch.
Subapical shade brownish-red. *var. ornata*, G.&R.
Colour pale, line on secondaries lost.
Of a pale purplish shade.... *var. bifiria*, H. E.
Pale, almost "sordid white"... *var. astoriæ*, H. E.
Larger, thoracic patch absent..... *inornata*, Neum.
Size small, longitudinal streaks more or less evident.
An obscure thoracic mark..... *strigosa*, Grt.
Without any thoracic mark..... *var. luculenta*, H. E.

Lines comparatively rigid, the basal dislocated on median vein, not toothed.
4th line white on costa.
Subapical patch distinct, yellowish, divided by the veins..... *inclusa*, Hüb.
Subapical patch darker, obscured..... *var. inversa*, Pack.
4th line not white on costa..... *jocosa*, Hy. Edw.

Family SATURNIIDÆ.

Median vein of primaries 3-branched, 8 of secondaries curved, free from base, and remote from subcostal; ♂ antennæ pectinated to the tip, often doubly bipectinated; secondaries with one or two internal veins; size large to very large. Genus AUTOMERIS, Hübn (= || *Hyperchiria* p., Walk).

A. Io Fabr., *var.* ARGUS, *n. var.*

♂.—Head, thorax, body, legs and wings light yellow. Both wings uniform in colour, with some darker basal tints. On secondaries a prominent blackish-blue ocellus with white central lunule, surrounded by an outer semi-circular black line.

Below a large black discal spot, with white central kernel on primaries, and faint traces of the transverse lines on both wings.

This aberration, which seems extremely rare, is immediately recognized by its immaculate wings, showing only the large ocellus on secondaries.

Caught at Hoboken, N. J.

Family LITHOSIIDÆ.

Genus HYPOPREPIA, Hübn.

H. MINIATA, Kirby, *var.* SUBORNATA, n. var.

♂.—The red colour of thorax, body and primaries of a lighter shade than in the typical form. The black coating on upper surface of abdomen entirely wanting.

Secondaries immaculate, light rose colour, fading towards anal margin, with a faint grayish, apical tinge.

A striking variation, easily determined by the delicate shade of its immaculate secondaries.

Habitat: Texas.

We do not regard *H. miniata* as a synonym or variety of *H. fucosa*, Hübn, but as a valid species. The following table will serve to distinguish the described forms:—

Wings brightly coloured, with three longitudinal mouse-gray bands.
- Ground colour of primaries entirely red.
  - Hind wings with broad mouse-gray border.... *miniata*, Kby.
  - This border lacking..... *var. subornata*, N. and D.
- Ground colour partly yellow, partly red.
  - Bands on primaries normal..... *fucosa*, Hübn.
  - Bands extensive, predominating and largely obscuring the ground colour..... *var. plumbea*, Hy. Ed.
- Ground colour entirely yellowish..... *cadaverosa*, Strk.

Wings obscure gray, thinly scaled, the secondaries pink. *inculta*, Hy. Edw.

Family HEPIALIDÆ.

Genus STHENOPIS, Pack.

S. ARGENTEOMACULATUS, Har., *var.* SEMIAURATUS, *n. var.*

Antennæ light brown. Head, thorax and body, bright salmon colour. Legs pink, tufted with yellowish hair. Ground colour of primaries pinkish salmon. All the maculations, transverse bands, as well as the subterminal space, of a peculiar brownish yellow, which in

fresh specimens has the lustre of pale gold. The two silver dots near origin of cell, in primaries, prominent, varying in shape from subovate to subtriangular.

Secondaries light pink, fading into salmon-coloured tinges along anal margin and in basal area.

Wings below pinkish, veins prominently so, fading into lighter shades in basal areas. Pink subterminal lines.

Habitat: White Mountains of New Hampshire.

This well-known form has never really been described. It figured for decades in collections as *Sth. var. quadriguttatus*, Gr., which latter name, however, is a synonym of the typical insect. The type form, as a generality, is not as large as this variety, of which some specimens measure as much as 85.–90. mm. in expanse.

Described from several examples of both sexes.

HEPIALUS ROSEICAPUT, *nov. sp.*

One ♂. Antennæ light brown.

Front of head and palpi pinkish. Interspace between antennæ red. Prothorax, thorax, body, legs and wings of luteous stone colour.

Primaries with minimal granules of the very faintest pink. Two lines of irregular, blackish dots. One from base along median vein to near centre of cell, where it turns down to internal margin, meeting an oblique transverse line of dots from apex. Subterminal line blackish.

Secondaries blackish gray with luteous fringes.

Below, both wings blackish gray, with luteous costa and fringes. Legs with an outside tinge of pink. A slight anal tuft of the faintest pink.

Expanse of wings: 33 mm.

Length of body: 6 mm.

Habitat: Cascade Range near Lytton, British Columbia.

This insect belongs to the group of small sized, dull coloured Hepialidæ of our western continent. The peculiarity of the pinkish tint of the palpi and parts of the head makes it easily recognizable.

The types of all the new forms here described are in Mr. Neumoegen's collection.

UNIDENTIFIED NAMES.

In going over the literature of the North American Bombyces, we have been unable to apply the following names. A number of them are types of genera of which the original descriptions are inadequate. In-

formation respecting any of them will be most welcome, especially structural notes, to supplement the imperfect descriptions of the authors:–

Pseudalypia Crotchii, Hy. Edw.
Erruca Pertyi, H. S.
Thia extranea, Hy. Edw.
Earias obliquata, Hy. Edw.
Cisthene lactea, Str.
Alexicles aspersa, Grt.
Cingilia humeralis, Walk.
Limacodes (Semyra) Beutenmuelleri, Hy. Edw.
Limacodes (Tortricidia) ferrigera, Walk.
Kronæa minuta, Reak.
Dioptis megæra, Fabr.
Psyche fragmentella, Hy. Edw. (case only).
Psyche coniferella, Hy. Edw. "
Pseudopsyche (Oedonia) exigua, Hy. Edw.
Sapinella (Eutheca) mora, Grt.
Oiketicus Davidsonii, Hy. Edw. (case only).
Chalia Rileyi, Heyl.*
Brachionycha barometrica, Goossens.
Dasychira clandestina, Walk.
Ichthyura apicalis, Walk.
Gluphisia septentrionalis, Walk.
Notodonta plagiata, Walk.
Edema obliqua, Walk.
Edema plagiata, Walk.
Certila flexuosa, Walk.
Saligena personata, Walk.
Heterocampa [illegible]oides, Walk.
" [illegible]ides, Walk.
" [illegible], Walk.
" [illegible], Walk.
Arctia [illegible], Walk.
Rhagonis [illegible], Walk.
Cossus [illegible], Str.

* [illegible] inadequate, but [illegible] to it in American literature.

NORTH AMERICAN THYSANURA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Smynthurus spinatus, n. sp.

Olive. Head tinted with purple, lighter on the sides, olive around the mouth and eyes; coarsely and sparsely punctuate, punctures light olive, each bearing a white hair. Antennæ purplish, basal joint lighter, as long as the body; apical segment with from seventeen to twenty subsegments. Abdomen fuscous with lighter spots; the apical part with an olivaceous cloud, the remainder fuscous with whitish or olivaceous blotches; on the middle of the back a number of groups of circular white spots, and on the posterior part of each side a row of white spots, varying from four to ten. Underneath olive. Anal papillæ large, distinct, with numerous bristles; the upper part and the sides purplish or fuscous, the remainder olive with darker spots. Legs long and slender, purplish or fuscous, mottled with variously formed olive or whitish blotches; apex of the tibiæ and base of the larger claw blackish purple. Claws long and slender, inner claw indistinct; apex of the tibiæ with a few clubbed hairs. Spring long, broad and flat, reaching the mouth; second joint broad, each side with a row of long stiff bristles; bristles twice as long as the spring is broad; third joint long, broad, bluntly rounded.

Length, 2 mm. (.078 inch).

Habitat: Ithaca, New York.

A very variable species, in young specimens the back is pea-green, and in some specimens there is a broad olive band down the middle of the back. The color varies from pea-green to purplish and fuscous. Collected on the surface of standing water. The species can be easily recognized by the row of stiff hairs on each side of the spring.

Smynthurus floridanus, n. sp.

Black, sides lighter, hairy. Head black, with lighter lines, mouth olive. Antennæ long, slender, as long as the body, basal joint black, remainder olive. Thorax and abdomen with a triangular black spot, the base of the triangle at the apex of the thorax and its apex at the apex of the abdomen. Sides of the abdomen olive mottled with light brown. Underneath olive. Anal papillæ with its front and upper part black, the remainder olive mottled with brown. At the median two-thirds of the back, a stout porrect spine; spine as broad at base and higher than anal papillæ; concolorous with the black triangle, except a small olive spot on each side. Legs slender, pale olive; inner claw two-thirds the length of

outer, stout and blunt. Spring short, slender; third joint elongate with an apical and two smaller inner teeth.

Length, 1.5 mm. (.058 inch).

Habitat: Florida.

I am indebted to Mr. Nathan Banks for this unique specimen and species. Easily recognized by the abdominal spine, the stout inner claw, and the black dorsal triangle.

The only characters offered by Lubbock, in his Collembola and Thysanura, for separating *Smynthurus* and *Papirius*, is the form of the antennæ and the presence or absence of tracheæ. In my studies of these interesting insects I have found two other characters valuable in separating these genera. These differences may be stated as follows:—

Terminal segment of the antennæ long, ringed; larger claw unidentate; apical segment of the spring simple..... *Smynthurus.*

Terminal segment of the antennæ short, with a whorl of hairs; larger claw bidentate; apical segment of the spring serrate on the under side..... *Papirius.*

Anoura magna, n. sp.

Body short, broad, one-half as broad as long, finely granulated. Each segment with four dorsal and two lateral globular tubercles, except the last, which is deeply divided, having at its apex two immense globular tubercles. On the anterior part of the anterior margin of each segment another smaller tubercle. From each tubercle there arise from four to eight short, stiff, yellow bristles. On the dorsal part of the head the number of tubercles is the same, but the two median tubercles are placed on the caudal portion of a large quadrangular tubercle, which reaches from between the bases of the antennæ to the caudal part of the head. The ground colour is a light steel blue, with lighter spots between the darker tubercles. Antennæ very short, not reaching the lateral margin of the body by at least a quarter of its width, segments subequal, indistinctly marked. Eyes at the side of the base of the quadrangular tubercle, postantennal organs wanting. Buccal orifice blunt, short and white. Legs short, with a single strong claw.

Length, 5 mm. (.20 inch).

Habitat: Salineville, Ohio.

This species can be recognized by its size, colour, and the globular tubercles; from *gigantea* Tullb., its nearest ally, from Siberia, by the absence of the postantennal organ.

NOMOPHILA NOCTUELLA, SCHIFF.

ORDER LEPIDOPTERA. FAMILY PYRALIDINA.

BY E. P. FELT, CORNELL UNIVERSITY, ITHACA, N. Y.

This is one of the most common insects that flies throughout the summer months. It is also widely distributed; adults have been taken in widely separated parts of Europe, in Algeria, Caffraria, Bengal, Pondicherry, Brazil, and in the eastern and western parts of the United States. Packard writes of the species thus:—"Such cosmopolitan forms give rise to the suspicion that they are relics of a past geologic age, which is borne out by the fact that quite a gap separates it from its nearest allies." In spite of its wide distribution, this insect seems to be one of these common species that has escaped observation, very little having been published on its life history.

On the 15th of last September the writer found among the grass and clover in a pasture several pale greenish larvæ (Fig. 2, b) with black heads and numerous black tubercles. Upon being disturbed they quickly disappear, with a peculiar wriggling, jerking motion, under the grass; they seem to move with equal facility either backward or forward. When not feeding the larvæ can be found under a slight web in the centre of a clump of grass. Later observations show that the larvæ live almost wholly upon clover leaves, eating out the soft parenchyma and leaving the veins; they will eat grass if clover is not within reach, and one larva was observed to seize an Aphid and devour it, though there was plenty of food within reach. J. H. Leach in his "British Pyralids" gives *Polygonum aviculare* (knot grass) as the food-plant in Scotland. As the larvæ become full grown they may be seen wandering around and slowly assembling under chips, stones, etc., where they pupate; when in pastures, dried cow dung seems to be the favourite resort. On the 21st of September both larvæ and pupæ were abundant in these retreats; ten pupæ (Fig. 1, c, d) were taken from a piece of cow dung one-fourth the size of a man's hand. Before pupating the larvæ spin around them a thin, white, loose cocoon.

After remaining in the pupa state about ten days the insects emerge. The adults (Fig. 1, e) are of a sombre brown and a tawny yellow colour, with black markings. They have a peculiar jerky flight, and when disturbed they fly up suddenly about four feet, and usually alight within two rods of where they started. When at rest (Fig. 2, f) they are usually on a leaf with the wings folded flat over the back and the antennæ extend-

ing forwards. Within a few days after emerging the adults pair and oviposition begins. The eggs (Fig. 2, a) are not all laid at once, but are deposited in clusters of from three to ten or more, usually being laid side by side in a row. The period of oviposition probably extends over two weeks or more, as the adults can live seven weeks, though most of them die within a month. One female was dissected; she contained over eighty eggs, which is probably about the average. When first laid the egg-shell is quite soft and readily flattens upon contact with other eggs, or the leaf upon which it is laid, so that it is usually flattened upon several sides to a greater or less degree. At first the egg is a pearly white, but it gradually turns to a slate colour.

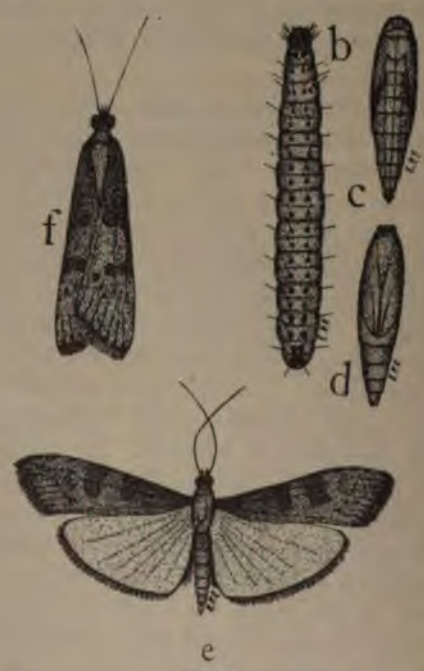

FIG. 1.

Nomophila noctuella: *b*, larva; *c*, pupa (dorsal aspect); *d*, pupa (ventral aspect); *e*, adult; *f*, adult (at rest). (All these figures are twice the natural size.)

The eggs hatch in about ten days, and the larva begins to feed upon the soft parenchyma of the leaf. The young larva has a brownish head and a straw coloured body, the tubercles are very small and the hairs longer proportionally than in the full grown larva. About a week after

hatching the larva moults; the skin ruptures between the head and the cervical shield and also splits a little ways along the back, and through this opening the larva crawls out of its old skin. Just after moulting the head and tubercles are a pale straw colour, later they become darker, and in the last stages of the larva they are almost black. The observed differences between the stages are a gradual increase in the size and depth of colouring of the tubercles, and a decrease in the relative length of the hairs. Before reaching its full growth the larva probably moults five times. In the fall, as the cold weather advances, the larvæ begin to spin nests in the axils of the leaves, where they retire when not feeding and in which grass is allowed to collect and around which the remains of partially devoured leaves are drawn, making a very complete hiding place. Later the nests in the axils of the leaves are deserted and similar nests are constructed upon the surface of the soil. These nests are lined with a thick layer of silk and are covered with a thick coating of particles of soil or bits of dried grass, making a thick, warm nest in which the larvæ pass the winter.

There seem to be three broods a year. In September of 1892 the simultaneous pupation of a large number of larvæ was very noticeable. The pupa state lasted about ten days, the adults emerged, eggs were laid and the larvæ moulted three or four times before cold weather forced them to retire for the winter. These hibernating larvæ come forth in the spring, complete their growth, pupate and the adults probably emerge in the first half of May. The second brood flies in the latter part of June, and the third brood, as already observed, flies the latter part of September. If the adult stage lasts four weeks or more, it would not be strange if the broods overlapped a little, especially the second and third broods, and this is borne out by a reliable record. During the year of 1889 the Entomological Department of the Agricultural Experiment Station, at Ithaca, N.Y., ran six trap lanterns from May 1 to October 20. *Nomophila noctuella* was picked out, the sexes determined and the results tabulated.

TIME OF FLIGHT OF NOMOPHILA NOCTUELLA, 1889.

	MAY.							JUNE.						JULY.													
Date.	5	6	7	8	11	19	20	3	5	16	28	30	1	6	11	15	18	19	20	21	24	25	26	27	31	Totals.
♂	1	3	2	2	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	3	3	2	5	40
♀	1																						2	1		4

	AUGUST.																		SEPTEMBER.								
Date.	1	2	3	4	5	6	7	9	15	16	17	18	21	23	24	25	26	29	4	6	8	18	19	21	25	29	30	Totals.
♂	2	3	1	3	4	0	2	3	1	1	1	0	1	1	2	1	1	1	2	1	1	0	1	0	1	1	1	36
♀					2	4		2	1			2										2	2	1			1	17

This table shows that the adults fly in greater or less numbers from May to the last of September. From May 20th to June 3rd none were taken, which pretty sharply defines the first brood. And, as might be expected, the second and third broods are separated by no such distinct line, and yet there is an indication of two later broods, though the table would seem to indicate that those taken in September might be the last of the second brood and not individuals of a third brood, which is contrary to observed facts. For during the last year a trap lantern was run with practically the same results as were obtained in 1889, but a third brood was observed to emerge in large numbers after September 20th. Probably the cool evenings prevented many moths from flying at night, and consequently from being taken in the trap lanterns.

Preventive Methods.—The above table shows that four-fifths of moths taken are males. If we assume that there are enough males left to fertilize the females, which is quite probable, the trap lanterns are almost useless as a means to check the increase of this insect, because the females escape, oviposit, and thus provide for the propagation of the species. As the larvæ and the adults incline to remain near one place, it is possible to materially reduce their numbers on limited areas. In large fields where plowing is not objectionable, many might be destroyed by thorough plowing in the latter part of November, after the larvæ have retired for the winter. Should this insect become very destructive in the summer, deep plowing in the middle of July, followed by harrowing, might destroy many pupæ. On lawns and other small areas advantage might be taken of the larva's habit of retiring under chips, etc., to pupate. If chips, etc., be placed on the lawn and firmly pressed down in the middle of July or of September, and allowed to remain a week and then collected and burned, many pupæ will be destroyed.

Technical Descriptions.

Egg (Fig. 2, a), pearly white when first laid, changing to a glistening slate colour within a few days. Shell finely reticulated; egg usually flattened upon several sides. Size, .69 mm. by .32 mm.

Larva (first stage), head diameter, .25 mm.; body, diameter, .15 mm.;

length, 1.05 mm. Clypeus, labrum and thoracic shield a tawny olive colour; head a seal brown; body a sordid straw colour. The tubercles proportionately smaller and the hairs longer than in the full grown larva.

Larva (Fig. 1, b), (last stage) length, 2 cm.; head, diameter, .32 mm. body, diameter, 3.7 mm. Head and thoracic shield black; scattering hairs occur on the head. Dorsal surface of body pale green with black tubercles. There are four tubercles on each side of the third and fourth segments, three in a row extending ventro cephalad and the fourth caudad of the last one in the row. The dorsum of the remaining segments i

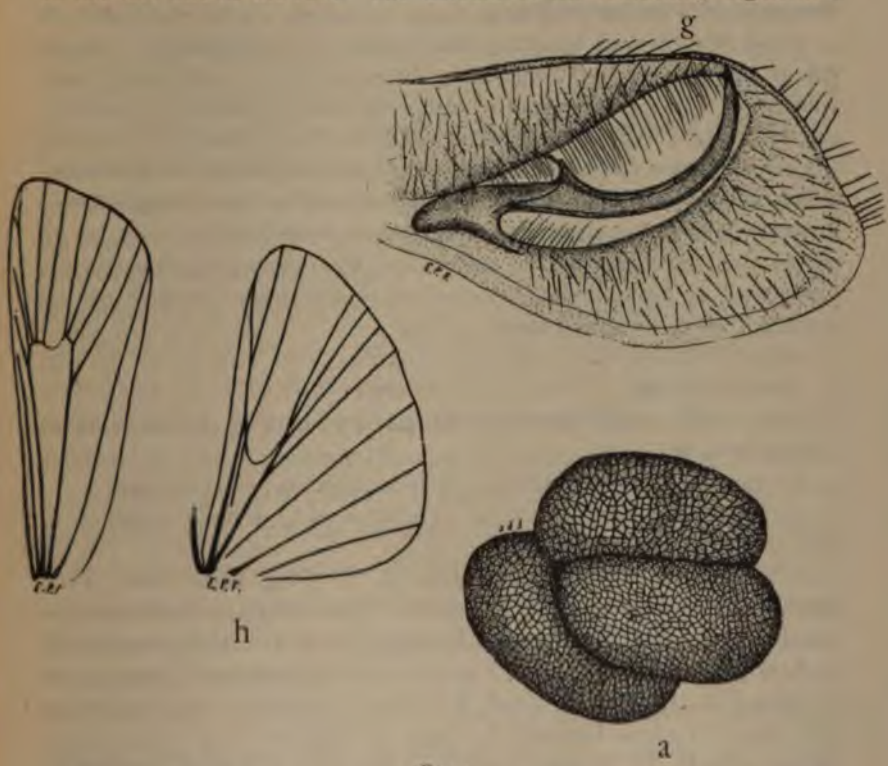

FIG. 2.

Nomophila noctuella: *a*, eggs, x 40; *g*, male genitalia (mesal aspect of right harpe and clasper), x 80; *h*, venation of wings, female, x 4.

divided by a slight transverse constriction into a cephalic and caudal part; the cephalic part of each segment bears three tubercles in a row, extending ventrad and forming with the tubercles of the third and fourth

segments a lateral, a super and a sub-stigmatal row of tubercles; the caudal part of each segment bears one tubercle, which is in the lateral row. The tubercles in the lateral rows on the thirteenth segment coalesce mesally. One or more hairs grow from each tubercle. Ventral surface sordid white with brownish tubercles. On the ventral surface there is a lateral row of brownish lunate tubercles, and on those segments not bearing legs there are transverse rows of four tubercles, those laterad being the larger. True legs brown with blackish tips. Five pairs of prolegs, occurring upon the seventh to the tenth and thirteenth segments inclusive. Prolegs short with brownish tips.

Pupa (Fig. 1, c, d), length 13 mm.; 3 mm. across the thorax. General colour light brown, venter lighter. Eyes prominent and usually dark coloured. The cephalic part of the pupal case is divided by sutures. Several of these unite at the base of the wing covers, where the chitine is thickened, darker coloured and pushed out into minute ear-like processes, which appear like dark spots. On the dorsum of the abdominal segments there are three dark stripes, extending from the thorax to the tip of the abdomen; one on the meson and the others, one on each side, just mesad of the spiracles. Abdominal sutures darker, darkest on the dorsum. Spiracles dark brown.

Adult (Fig. 1, e, f).

Male Genitalia.

Harpe (Fig. 2, g), membraneous; size 1.55 mm. by .81 mm.; mesal surface concave.

Clasper (Fig. 2, g), chitinous; fulvo-ferruginous; sickel-shaped.

Venation of wings (Fig. 2, h). Frenulum of ♂ a single spine, of ♀ two spines.

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FURTHER ON THE DIPTERA CONSIDERED AS THE HIGHEST INSECTS.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

In my article in CANADIAN ENTOMOLOGIST, 1893, pp. 7-8, as also in my previous note in *Science*, Vol. XIX., 1882, p. 320, I stated that Hyatt and Arms were the first to point out that the Diptera were the most highly specialized insects, and consequently to be considered the highest in rank. It should be noted, however, that the same idea was advanced at the same time by the renowned insect anatomist, Mr. B. T. Lowne, well known for his work on the anatomy, etc., of the blow-fly. In part I. of this work, Oct., 1890, p. 25, Lowne says:—"The blow-flies belong to the family *Muscidæ*, one of the most highly specialized groups of the Diptera, the most highly specialized order of the class Insecta."

On pp 26-7, he further says:—"Just as all discussion would be futile as to whether a bird or a mammal is the higher type, so it is useless to consider whether the Diptera or the Hymenoptera have the higher organization; but there can be no question as to which of these orders departs most from the more generalized form. The Diptera are far more remarkable in their developmental history, and in the modification of structure which they present in the adult or imago form. In this relation the strong tendency of many to produce their young alive, and the fact that some have a capacious matrix, or uterus, in which the larvæ are hatched, or even attain the pupa form, before birth, is not without interest, presenting as it does some analogy with the viviparous character of the mammalia amongst vertebrates—whilst the nest-building instincts are more manifest in Hymenoptera and in birds. [This is an important analogy, and well pointed out.—C. H. T. T.] It is true that the flies, and more especially the heavy forms, with a comparatively tardy flight, like the blow-fly, have been regarded as 'stupid'—Sprengel called them 'die dummen Fliegen'—and do not excite our sympathy and curiosity to the same extent as the social Hymenoptera; but it is impossible to judge of the intellectual functions of an insect. The manner in which the blow-flies and their near allies, the house-flies, have made themselves at home

with man, speaks for their power of adapting themselves to new and varied conditions. They are cunning, wary, and easily alarmed, and, except when benumbed with cold or heavy with eggs, know well how to avoid danger. They appear to me far more clever in this respect than the bees and wasps."

My article in the CAN. ENT. was written before I saw the above quoted passages in Lowne's work. In his first edition of the anatomy of the blow-fly (1870), Lowne does not advance any ideas with regard to the systematic position of the Diptera.

The real credit for the original discovery and correct interpretation of the extreme specialization of the Diptera belongs to Weismann, who published a paper upon the development of the Muscidæ,* in 1864. Later, in 1876, Ganin sustained in the main the investigations of Weismann. Lowne first presented these views in English, at least in the Old Country, while Hyatt and Arms were the first to call attention to them in America.

The consensus of facts bears out the statement that the Diptera are the most highly specialized, and therefore the most highly organized order of insects. While they possess ancient as well as recent forms, they have, in the muscid families, reached a higher plane of development than any group in any other order. It is by no means contended that the Nemocerous Diptera are as highly organized as some groups in other orders, since they comprise the most ancient living forms of Diptera.

The Diptera probably find their culmination in the Tachinidæ, and of this family doubtless the Phasiidæ stand first. *Trichopoda*, *Phasia*, and *Hyalomyia* may therefore be considered as probably representing the highest forms of insect life.

ROYAL SOCIETY OF CANADA.

The next annual meeting of the Royal Society of Canada will be held in the City of Ottawa, on the 23rd, 24th and 25th of May. The Society will be represented by Mr. Hague Harrington, our Vice-President. We notice by the programme that Mr. Harrington is to read a paper on Canadian Uroceridæ, a subject to which he has given much attention.

*Die nachembryonale Entwicklung der Musciden nach Beobachtungen an *Musca vomitoria* und *Sarcophaga carnaria*. Zeit. f. Wiss. Zool, XIV., 187 (1864).

Mailed May 18th.

The Canadian Entomologist.

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NOTES ON CHIONOBAS SUBHYALINA, CURTIS.

BY WM. H. EDWARDS, COALBURGH, WEST VA.

This species has long been lost sight of. It was described nearly sixty years ago from a single male "in good condition". I never have heard of its forming part of any collection excpet that of the British Museum, and my own, and my specimens—a male and a female—were sent me from the Museum more than twenty years ago. In his Catalogue of the Satyridæ, 1868, Mr. Butler says of this species: "We do not possess the type, but our specimens agree exactly with Mr. Curtis's description." Of my two specimens, the female was broken and the wings rubbed so that they were worthless for characterization, but the male is in fair condition. It does not agree with the description in some points. Thus, there are not "two indistinct white dots towards the apex with black ocelli"; and the surface of the under forewing cannot be called "mottled with ochre and pale black, lightest at apex", but the scales are abraded where the mottling should be. The description goes on: "inferior wings spotted and mottled with black and dirty white, forming a waved and curved pale line beyond the middle, with three or four whitish dots beyond it." My male has a slight and pale mesial band "waved" (or crenated) "and curved"; and if the dots beyond it may mean dots on the hind margin, the description will answer. The wings are described as semi-transparent, and this male is so to an unusual degree.

I have had for three years a single male taken by Mr. Bean at Laggan, which in some points agreed with the description of *Subhyalina*, but failed in others. There were no apical dots, no mesial band, and no whitish dots. Instead of the band there is a discoloration in patches, especially on the two margins, where the band would be. Therefore, I have been uncertain as to the position of this individual. But I have recently received two males from Mr. Fletcher, and six males and one female from Mr. Neumoegen, all taken by Mr. Bean at Laggan, kindly loaned me for examination, and this new material makes it certain that

the species is *Subhyalina*. All these examples are remarkably transparent, and on the disk of forewings beneath there is almost a total absence of dark or mottled scales. But, at the apices there is decided mottling, the light colour prevailing. Some, however, have fine brown scales in the upper interspaces as well as over the cell. One male has two light subapical dots on upper side, though without black centres, the others show no trace of these. On the under side of the hind wing all these examples agree with the description, and are spotted and mottled with black and dirty white. In respect to the band there is extreme variation, some being quite unbanded, though in these the disk is more or less clouded darker; others have a pale band. One male and the female show an indistinct outer edge of the band, which answers to the description, "a waved and curved pale line"; and two males present the band clearly defined on the posterior side, and nearly so on the basal; but the band is, after all, scarcely more than a shadow, nothing so distinct as is usual in the allied species. As to whitish dots on the margins, three males and one female have them, the rest do not.

Mr. Butler gives "Arctic America" as the locality of this species, but I know of no other than Laggan.

I shall give a plate in Butt. N. A. to Subhyalina presently.

ADDENDUM.

After I had sent the foregoing lines to the editor I received two more females of the species treated of, from Dr. Skinner, from Laggan like the rest. One of these in no way seems to differ from the female before described; but the other varies in that half way between the outer edge of the band and the margin, on four interspaces, in the middle of each—the lower subcostal to second median, is a small whitish spot, clearly defined on the two lower interspaces, diffused on the others. This character agrees completely with the description by Curtis as to "three or four whitish dots beyond" the middle of the wing. I find therefore in one or other of the twelve examples viewed, every one of Curtis's characters except black points in the apical spots. But in only one of the twelve is there any appearance of apical dots on upper surface and in only one whitish dots beyond the band. The same female which offers the dots beyond the middle differs from the other eleven, in having a row of whitish dots on the corresponding interspaces of the forewing, two fifths the distance from the margin to apex of the cell, in a straight line, not parallel therefore to the margin. All three of these

females have the band undefined, cloudy. I see that occasionally in a dark *Semidea*, white spots are present in similar position on the under hind wing to that of this last-mentioned female *Subhyalina*.

FIELD NOTES FROM TEXAS AND LOUISIANA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

In the summer of 1892 I spent a month on the line of the Southern Pacific R. R., between Morgan City, Louisiana, and San Antonio, Texas. While the collecting was by no means of the best, a few notes may interest the readers of the CANADIAN ENTOMOLOGIST and give some idea of insect life in the Southern States during the hot months.

Morgan City lies to the west of New Orleans on the Atchafalaya River, in a country so flat that, as the natives say, "Water will only run as far as you dig a ditch for it." The neighbourhood is covered in great part by heavy woods, with a rank underbrush of poison oak, trumpet creeper and palmetto, the ground beneath all being, at the time of my visit, soaked with rains and dotted with innumerable pools of water in which mosquitoes were freely breeding. Along the edge of the woods I had to do the most of the collecting, as I found it quite an impossibility to brave the attacks of the mosquitoes and Tabanidæ in the depth of the forest.

The palmetto proved to be the plant best worth hunting over, and when I arrived on the twenty-second of June it was in bloom, or just going out in some cases. Where the flowers were fresh and sweet there were numbers of *Euphoria sepulchralis* and *Trichius delta*, the latter the less numerous and very hard to capture in the bright sunshine, though when cloudy weather prevailed they were much more sluggish. *Chauliognathus marginatus* occurred on the flowers in numbers, but it was not considered worth while to take many of them, as it appears to be common from Pennsylvania south, though I never take it in Iowa. *Paria canella* occurred once in a while, and a single specimen of *Phyton pallidum* was also shaken into my umbrella. When the flowers had fallen off, disclosing the newly-formed fruit, I found a very nice Curculionid beetle, *Pachybaris porosus*, which was known previously from Florida. It seemed not to occur on the plants except where the flowers had commenced to drop off, and quite likely oviposits on the newly-formed fruit. Wherever an open patch allowed a chance for growth of wild sunflowers, there were a good many beetles of other kinds—*Mecas inornata*, *Systena*,

sp., and a *Baris*, which seems to be new. A Solanum yielded a few specimens of an *Anthonomus* and a very small specimen of *Trichobaris trinotata*, a species which has proved in places a very serious pest to the potato. By scratching away dead leaves in a thicket a few *Lachnosterna ephelida* were secured, and a few also of *Anisodactylus maculicornis*. A rotten log, on being broken, disclosed an example of *Chlænius fuscicornis*; another contained several specimens of *Passalus cornutus*, with its larva. An ant's nest held, besides the legitimate inhabitants, a number of the curious little *Limulodes paradoxus*, which I have found with ants from Iowa to Arizona. Dry fungus was full of *Enneartbron*, and in it I found also a specimen of *Euplectus linearis*.

At night, around the light, I added still a few species to my collecting bottles—*Hippodamia parenthesis*, *Atænius figurator*, *Cyclocephala immaculata* and *Lachnosterna ephelida*, but insects were not by any means as common as I had expected them to be, so on the twenty-sixth I left for Houston, Texas.

The next afternoon, arrived at Houston, I found inside of the city limits great numbers of a beautiful weevil, *Eudiagogus pulcher*, which has a curious habit in lieu of dropping off the food-plant, as is usual with most Rhynchophora when disturbed. It feeds on the leaves of the coffee-weed, and usually remains on the upper surface of the leaf while eating in plain sight. If disturbed, it whirls quickly around to the under surface of the leaf, and either remains clinging there or runs rapidly down the stem of the plant towards the ground, keeping to the under side, so as to be invisible from above. With it I found associated *Anomœa laticlavia* and *Neoclytus erythrocephalus*.

Along the sides of the track, where the vegetation was rank, I got a few beautiful specimens of *Œdionychis* and a few of *Paria viridicyanea*. Under a stone occurred several *Psammodius nanus* in burrows which they had made just at the surface of the ground, much as some Scolytidæ bore in bark. A stump covered with fungi was next investigated and proved quite a rich find, yielding *Platydema* of two or three species, *Hoplocephala bicornis*, *Tritoma erythrocephala*, *T. angulata* and *T. atriventris*, besides several examples of the pretty little *Formicomus scitulus*, which seemed not to live on the fungi, but on the ground near them.

The woods themselves yielded beetles of a different sort. Beating branches of lately cut pine trees was productive of a number of *Drasterius amabalis*, a few *Silvanus rectus*, and a few other things. A little *Mono-*

hammus of the form called *minor* was taken, also a *Buprestis* and a *Chalcophora*. Where a live oak was being cut up I found *Chrysobothris femorata* var. *Alabamæ* and *Neoclytus scutellaris* running over the branches, but they were wild and difficult of capture. A large fungus was found to be often infested by *Pocadius helvolus* and a smaller one by *Pallodes silaceus*. Of these latter, when the fungus was small only one or two specimens were found in it, but larger fungi yielded more beetles. Five or six specimens of *Octotoma plicatula* were taken on leaves, and looked very little like living things when at rest.

Washing the banks of a stream brought very little to light, except a few specimens of *Tachys* and a very small *Heterocerus*; water-beetles were almost entirely absent. One incident of interest was noticed here, however, when a little *Tettix* (I use the generic name in the old, wide sense) was disturbed and jumped into the water, alighting on a stick that was completely submerged to the depth of about an inch, and rested there until I captured it. This brings to mind a note of Mr. Roberts in "Entomologica Americana," where he states that he found *Stenus* on masses of frogs' eggs which were completely submerged.

Collecting on weeds along the edges of woods and in open patches disclosed a number of *Conotrachelus leucophæatus* in the heads of a plant with milky sap, and with them occurred large numbers of *Aphthona texana*, a little jumping beetle of rather slow movements. I took all of them with my fingers without great trouble. *Henous confertus* runs around in grassy places during the morning and evening, having apparently the same habits in this respect as many of its wingless relations.

A day was spent in making a side-trip to Galveston to get in sea-shore collecting. The beach was alive with *Cicindela saulcyi*, but the only other Coleoptera there were *Phaleria* sp., and an Oedemerid, probably an *Asclera*. Farther back, out of reach of the tides and salt spray, I got a great number of *Haltica punctipennis* which was swarming on some low weeds.

Columbus was reached on the morning of July fifth, and work commenced at once. Though only a few hours ride from Houston, it is in quite a different looking piece of country. The valley of the Colorado here is wooded with deciduous trees, the pine having disappeared, and the better drainage is apparent from the nature of the soil. This spot was made historic in the annals of Entomology by the labours of Mr.

Schwarz, and the papers of Drs. Leconte and Horn of a few years back are full of allusions to species collected there by him. I hoped to find it an interesting field, and was not disappointed.

Most of the work was done along the river bottom, where the cottonwood timber was usually sufficiently free from underbrush to admit of freedom of movement and of sight. The felled trees, when the bark was peeled off, furnished *Toxidium compressum*, *Litargus balteatus*, *Epierus regularis* and *Bacanius punctiformis*. Beneath the old trunks were found *Blapstinus fortis* and *arenarius*. The cow-droppings were productive of *Copris carolina*, *Phanæus triangularis*, *Onthophagus pennsylvanicus*, *Aphodius tenuistriatus* and *stercorosus* and *Cercyon variegatum*. The banks of the river were covered with *Cicindela rectilatera* and *C. sperata*; *Tetragonoderus fasciatus* and *T. latipennis*, the latter abundant, were to be obtained in more circumscribed spots with a species of *Stenus* near *stygicus*. The weeds on the bars, on being pulled up, were found to shelter around their roots a colony of *Agonoderus comma*, *Anthicus difficilis*, *A. nanus*, *Metachroma interrupta* and *Myochrous denticollis*. This *Myochrous* was also often found feeding on willows.

On leaving the immediate vicinity of the river and working along the roads, *Languria læta* is found commonly with *Acylomus calcaratus* and *Conotrachelus leucophæatus*. Arriving at a point where a little creek crossed the road, I ascended it, and where a tree had been felled across it some years ago and was consequently in a rather advanced stage of decay, settled down for an hour or two of solid work. By peeling off the bark carefully I was able to get everything worth taking, as whatever was nimble enough to escape my bottle at first, fell into the water and was easily secured. The results were two *Mallodon dasystomus*, several *Eupsalis minuta*, *Platydema ruficorne*, *flavipes*, *lævipes*, *Eustrophus bicolor*, and several other things. Leaving this spot and going on to a freshly cut mesquit, I got under the loose bark four or five specimens of *Conotrachelus anaglypticus*, a few *Carpophilus semitectus*, and some *Laemophlæus chæmeropis*. Under damp logs I found the specimens of larvæ, pupæ and imagines of *Epipocus* described in another paper.

After a week's stay at Columbus I moved on to Harwood, which is at a considerably higher altitude—here the cottonwoods were gone and replaced by mesquit and oak, much of it "scrub." The collecting was not nearly so good and of a different character, *Eleodes tricostata* being one of the most prominent beetles. Two or three *Pasimachus* were found under

logs, also a pair of *Romaleum atomarium* and a large *Mallodon serrulatus*. *Acmæodera pulchella* var. *mixta* and *Bruchus amicus* occurred on flowers. The leguminose trees and shrubs yielded, by beating, *Cryptocephalus defectus*, *Epicauta nigritarsis* and *Coleocerus marmoratus*, while under the bark and in the wood of dead trunks and branches I took a number of *Phlœonemus catenulatus* and *Trogoxylon*, sp , besides a fine *Amphicerus*. The dead wood was full of cerambycid larvæ.

The next stop was made at Luling, in the San Marcos Valley, a spot which pleased me more than any other in Texas. The river bottom is heavily wooded in places, and the holes and cracks in the great trees were the hiding places of beetles of large size and great beauty. The fine *Zopherus haldemanni* was taken here in some numbers, sometimes resting on the surface of logs which were lying on the ground, or, just as often, climbing on the trunks of trees seven or eight feet up. Besides these I got a large *Mallodon*, two *Alaus lusciosus* and a number of *Strategus julianus*, the last nearly all dead but in perfect order—sometimes not yet stiffened. They occurred in holes where trees had been torn up by the roots, or often simply lying on the ground without cover or protection of any sort. *Photuris pennsylvanica* was found very commonly in one spot, clinging to the trunks of trees close to the ground, while three or four *Chlænius orbus* were taken beneath logs in damp places. A pair of *Canthon cyanellus* were detected in the act of inspecting a dead clam on the river bank and were promptly "run in."

The weeds along the roads were full of a species of *Chrysomela*, for which I can get no name. The great compositæ by the edges of the cotton-fields furnished numerous *Lixus laesicollis*, *Smicronyx obtectus*, *Pachytychius amoenus*, and some other weevils.

San Antonio did not prove to be in as good a locality for beetles, and only in a few favoured spots could anything be found. Beating along the track of one of the lines of railroad proved more productive tnan anything else, and in this way I obtained a number of *Cryptocephalus defectus*, *Coccinella abdominalis*, *Epicauta nigritarsis*, and a little Galerucid not yet described. The banks of the river, close to the source, yielded *Ega sallei*, *Oodes* sp., *Ochthebius foveicollis*, and *Limnichus lutrochinus*, with several other things; but the great haul of the season was a lot of several dozen assorted ticks, which I collected on my own person after sitting on a stone in the woods for a few moments to eat my lunch.

A NEW GASTROPACHA.

BY J. J. RIVERS, UNIVERSITY OF CALIFORNIA, BERKELEY, CAL.

Phyllodesma Dyari, n. sp.—General appearance of the palest sienna or yellowish-ochre. Thorax and patagia thickly clothed with short hair of a uniform pale tone, the abdominal covering similar, but longer and finer, which gives to it a slightly silky appearance.

♂. Anterior wings with the anal angle deeply emarginate; three lines of dusky spots cross the disc ending near the costa, these being lines rather than bands. There are in some examples two dusky spots, one more conspicuous than the other, in the discal space. From the hind margin up to the middle line of spots, and extending to the apex of the wing, the area is of a rosy or peach-brown; the remainder of the wing being paler and colder in tone, in fact ochry-yellowish.

Posterior wings with the usual deep emargination on the costa. From just above the anal angle, a pale and rather wide band runs across towards the outer margin; this pale band widens on the inner margin when in contact with the abdomen, and this part of the wing is clothed with the same long filament-like hairs as the abdomen.

Fringes of all the wings rusty and white in separate rows of scales, the basal row being rusty and running out and covering the points of the nervules, while the white scales are seen only in the hollows of the crenations.

Beneath, pale rosy-brown, a darker central band traverses all the wings, beginning near the costal edge of the forewings, and finishing short of the anal angle of the hind wings. There appears on some specimens only, a short second band, when the ground colour between them is whitish. In the central area bordering the emargination of the hind wings is a wide patch of rusty brown.

♀. General appearance much paler than in the other sex, being very pale creamy or ochry-yellow. Margins of all the wings crenate; strongest on the hind margin of the posterior wings and decreasing in boldness towards the apex of the anterior wings. There are faipt lines of spots on the disc of the forewings, suggestive of bands, and on the hind wings the only variation of the same pale expression of the whole insect is a broad, well-defined band of a lighter colour, that crosses the wing from above the anal angle.

Beneath uniformly pale ochry-brown, with a large attendant patch, conspicuously darker, in the immediate region of the emargination of the hinder wings.

Expanse of wings, ♂, 1.55–1.80 inches; ♀, 2.25 inches.

Habitat: El Paso, Texas.

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF CERTAIN SPECIES INHABITING THE ROCKY MOUNTAINS IN LATITUDE 51° 25′.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

(*Continued from page 132, Vol. 22.*)

ELEVATIONS IN VICINITY OF LAGGAN.—Altitudes near Laggan have in some cases been very incorrectly stated. In "Appleton's Canadian Guide-Book; Western Canada," published 1892, the altitude of Louise Lake (Emerald Lake of the Geological Survey) is given as one thousand feet above Laggan, and the elevation of Agnes Lake is stated at three thousand five hundred feet above Laggan. Such statistics are worse than useless.

The elevation of the Canadian Pacific Railway at Laggan, by latest profiles. is five thousand and eight feet. Emerald Lake is five hundred to six hundred feet higher—its elevation can hardly exceed five thousand six hundred feet. Agnes Lake is about two hundred feet below the normal timber-line, so that its altitude is not far from six thousand eight hundred feet; it is eighteen hundred feet above Laggan, and pretty ac curately twelve hundred feet higher than Emerald Lake.

According to the Geological Survey Reports, timber-line on the mountains around Laggan occurs at about seven thousand feet. This elevation compares with an altitude in Colorado of something over eleven thousand feet. Gannett's "Dictionary of Altitudes" gives U. S. Survey estimates of 31 timber-lines in Colorado, of which 29 are above eleven thousand feet.

CARTEROCEPHALUS PALÆMON, Pallas.

Paniscus, Fabricius.

Mandan, Edw.

Material of *Mandan* examined:—1 ♂ from Nepigon (Mr. Fletcher); 36 local ♂ s. some imperfect, but nearly all bright and readable; 1 ♂, 1 ♀ from Banff (Mr. H. K. Burrison); 12 local ♀ s, all being legible, and 8 of them bright and fine. Examples of *Palæmon* compared:—4 ♂ s, 2 ♀ s from Germany; 2 ♂ s, 1 ♀ from Zurich, Switzerland; 2 ♂ s from northern Finland.

This examination was undertaken because from frequently repeated comparisons of the Bow Valley *Mandan* with *Palæmon* the essential agreement of the two had become evident. Until this final study was

made, I had thought *Mandan* of New England and eastern Canada might be distinct not only from *Palæmon* of Europe, but also from *Mandan* of the Bow Valley. That idea I can no longer entertain. The amount of variation among my few instances of *Palæmon* proves to be greater than I have hitherto considered it, and this fact lessons the probability that the name *Mandan* covers two species. My reasoning is:—(1) The European *Palæmon* is so uniform in size and colour, and presents its variations in a manner so undemonstrative, that the true values of its variations are easily recognized, and it is readily seen that the several variational phases constitute but a single species. (2) *Mandan*, like many other of our lepidoptera, is strongly influenced by the meteorological peculiarities of widely separated districts inhabited by it in North America, and in certain extreme conditions displays its variational capacity with a freedom, an exuberance, quite in contrast to the conservative variation of species in Europe. (3) As I find the variation in *Palæmon* essentially as important as the more emergent and erratic variation shown in certain environments by *Mandan*, and as *Palæmon* in its various attitudes is inseparable from corresponding aspects of *Mandan* and helps to render evident the unity of *Mandan's* extreme phases, I am therefore led to believe *Mandan* contains but one species, although it has been so well supplied with synonyms and its extremes of colour variation are so great.

In the material at hand, together with the *Mandan* literature accessible, I find no indication of more than one species, unless it be the difference in food-plants—The Nepigon and Bow Valley sections eating grasses, while *Palæmon* of Europe is said to feed on *Plantago major*. This diversity does not greatly impress me, as the "unexpected" in that line often happens. After discovering (Aug. 5, 1889) that *Colias nastes* eats Willow, and having (in August, 1890) persuaded *Grapta zephyrus* to accept a diet of rose, I am prepared for almost any specialty in food-plants. *Melitæa anicia* feeds on two species of plants, or more; so does *Lycæna aquilo*.

From the insects compared I have the following information. The Banff specimens agree with the Laggan series. The Nepigon ♂ is almost a copy of one Finland ♂—if smaller, the difference is very slight; it differs above forewing in having the median yellow-brown spots shorter (partly obliterate); on under side the Finland example is more suffused with yellow and the spots under hind wing are less clear; in every

essential character the two insects are alike. The Bow Valley material has been determined as *Mandan*. If it is *Mandan*, then *a fortiori* it is also *Palæmon*, for it is closer to *Palæmon* of Germany than to the *Mandan* of eastern North America Arranging the entire series according to affinity of variation, the Nepigon specimen goes to one extreme, next in order follow the two Finland *Palæmon*, then two of the *Palæmon* from Germany, and a number of the Bow Valley *Mandan*. Nearly all the remaining Bow Valley *Mandan* range still further away by an increasing size and boldness (conspicuousness) of the fulvous spots above primary, these spots being in some specimens so enlarged as to replace almost entirely the dark brown of general surface. The two *Palæmon* ♂ s from Switzerland, two of the German *Palæmon* and a small section of the Bow Valley *Mandan* ♂ s follow a line of variation somewhat diverse from what is seen in the major part of the series, but without special bearing on the main question, except as further illustrating the fact that *Mandan* is more ready to break ranks than is consistent with due respect to "the authorities." In one particular, all the North Americans examined are alike—the spots under hind wing are clear in colour and distinctly in contrast to the ground colour. Part of the Europeans agree with the North American specimens in this, and the others have the spots suffused with dull yellow as in *Carterocephalus silvius*. The description of *Mandan* in Fernald's "Butterflies of Maine," indicates that the Maine *Mandan* is practically like that of Nepigon, and that the spots below hind wing are clear in colour; the description in general covers *Palæmon* equally with *Mandan*. Mr.W. H. Edwards, in his description of *Stereoptes skada*, mentions that the spots below hind wing, except the outer rows, were of a yellowish tint. Mr. S. H. Scudder describes the spots beneath hind wing of *Hesperia mesapano* as "very large silvery white spots"; in the Laggan specimens the colour is a pale buff, scarcely white in any.

Mandan in the greater part of its range seems to be extremely rare. A few captures have been recorded, made in New England and at various localities in the Province of Quebec, with one or more in Alaska and Labrador. It appears to have been found in frequency only in two districts—the region between Hudson Bay and Lake Superior, and the Bow Valley. Mr. James Fletcher's records for Nepigon are well known. Mr. J. Jenner Weir, in THE ENTOMOLOGIST, writing of lepidoptera collected chiefly at Moose, on south coast of Hudson Bay, makes this record :—

"*Heteropterus mandan*, Edw.— Much resembles *H. paniscus*, Fab.; common in 1883, but not observed before."

A specimen of *Mandan* was in 1872 determined by Mr. H. K. Morrison as *Paniscus (Palæmon)*. In an account of lepidoptera collected on Anticosti, Mr. William Couper writes:—"*Hesperia paniscus*, Fabr.—A single specimen captured at Fox Bay, Anticosti, on the 26th June. It was sent to Mr. Morrison, who informs me that it does not differ in the slightest from the European specimens of *paniscus*. It is close to *Mandan*, Edw."—(CAN. ENT., Nov., 1872.) At that time *Mandan* was excessively rare in collections.

Carterocephalus palæmon of the Bow Valley is larger than the same species in Europe and eastern North America, and is more variable in size, ranging from expanse of the Finland and Switzerland instances to a size noticeably exceeding that of the German examples. It displays greater individual variation also as to size and colour of the fulvous spots above forewing. At Laggan it chiefly frequents grassy meadows along the Bow at an altitude of 4,800 to 5,000 feet, the ♂ in ordinary seasons appearing early in June and the ♀ during last half of the month. Several ♀s have been taken at Emerald Lake in early July, and 1 ♀ at Agnes Lake early in August. It occurs also at Stephen, B. C., six miles west of Laggan.

This is one of those species which come from pupa earlier or later according to the forwardness or tardiness of the season; it is by no means so prompt to a date as are some of the local butterflies. There is no indication of more than one flight in a season.

ADDITIONAL NOTE ON THE LARVA OF PALÆMON.

After sending away the foregoing, a very interesting article was me, with in *The Entomologist* (London, England), Oct. and Nov., 1892, which tends to confirm my views already stated:—"Life History of *Carterocephalus Palæmon*, by F. W. Frohawk, F E.S." So far as I can judge Mr. Frohawk's account of the larva of *Palæmon* agrees substantially with the description of the larva of *Mandan* published by Mr. James Fletcher in CANADIAN ENTOMOLOGIST, June, 1889. My main object in the present reference is to mention that *Palæmon*, as well as *Mandan*, eats grasses. Mr. Frohawk reared his larvæ with success on *Bromus asper*.

My own incomplete notes of the local larva, from observations made in June, 1889, agree entirely with Mr. Frohawk's account. An interesting fact in my experiment was that several of the eggs were laid by lamp

light at eleven o'clock one night. The young larva emerges near apex of egg, and usually eats little, if any more of the shell than sufficient to allow of his exit. The larvæ fed on grass.

I make no citations from Mr. Frohawk's article. It should be read entire by all interested in the subject.

ADDITIONS TO THE LIST OF CANADIAN LEPIDOPTERA.

BY J. ALSTON MOFFAT, LONDON. ONT.

During the years 1891 and 1892, I have received the following names new to the Canadian list. Some of the specimens have been in my possession for several years, as I hoped to secure others of the same kind, whereby I might obtain their names without inconveniencing anyone by a request for their return. But they remain uniques with me to the present time ; solitary witnesses to the fact that they are to be got, if looked for in the right place at the right time.

The gentlemen to whose kindness I am indebted for the identification of my material are : Prof. J. B. Smith in the Bombycidæ and Noctuidæ, Rev. Dr. Hulst for the Geometridæ, and Prof. C. H. Fernald in the Micros. I have followed the sequence and nomenclature of Prof. Smith's list of 1891.

Scoleocampa liburna, Geyer.

I captured this specimen at Ridgeway in July, 1885. And I see by the Buffalo list of 1891 it is therein reported as "taken occasionally in Lancaster, at light," by Mr. E. P. VanDuzee. I am not aware of its having being taken in Canada since.

Epiglæa decliva, Grote.

A single specimen taken at Hamilton eight years ago, in the autumn, when looking for Scopelosomas and Lithophanes.

Xylina tepida, Grote.

A single specimen taken at London, September 29th, 1891. On one of my visits to Mr. Grote in Buffalo, whilst he was naming some Lithophanes for me, he called my attention especially to this species as "one that ought to be found with us," and yet this is the first intimation that I have received of its being taken in Canada.

Litognatha litophora, Grote.

Herminia petrealis, Grote.

Hypena damnosalis, Walker.

No doubt several more of the Deltoides might be added to our list, if they were closely looked after, but the unattractive appearance of many of them, and the difficulty in separating the forms, has a tendency to weaken the interest taken in them.

Acidalia subalbaria, Pack.

Eudeilinea herminiata, var. *albata*, Guen.

Semiothisa præatomata, Harv.

Tephrosia cognataria, Hub.

Paraphia unipunctaria, Haw.

Petrophora truncata, Hub.

Phlyctænia extricalis, Guen.

Homophysa psychicalis, Hulst. Two specimens taken at London in 1892. This handsome little species was described and named *Botis psychicalis* by Dr. Hulst in 1886, from two females taken in Georgia and Texas.

Hydrocampa stenialis, Guen.

This delicate and highly ornamented species I had taken at Hamilton for several years, one or two in a season, although only obtaining the name of it last November. During the season of 1892 I came on a colony of it at London and secured six. It is variable in size and depth of colouring, but varies little in the design of ornamentation, considering it is so elaborate. Dr. Hulst redescribed a specimen from Florida, under the name of *H. australis*. He gives the expanse of wings as 16 mm. I have one that is 15 mm., but I also have one that is only 10. Dr. Hulst gives the colours as fuscous and light ochreous. One of my specimens is of a deep leaden hue, with the light portions greatly reduced in size.

Schœnobius melinellus, Clem.

Perispasta caeculalis, Zell.

A single specimen taken at Hamilton several years ago. It was sitting on the upper side of a leaf quite exposed. Its unusual form and marking attracted my attention at the time, and although I looked for it regularly afterwards in that locality, at the same season of the year, I never came upon another, and the only other one I have seen was sent to me for determination by Mr. Winn, of Montreal.

Perispasta immixtalis, Grote.

A single specimen taken at London in the season of 1892, and that in rather poor condition.

Teras nivisellana, Wlsm.

" *variana*, Fernald.

Cacœcia rosana, Linn.

Œnectra pilleriana, Schiff.

Exartema punctana, Wlsm.

This attractive species I had been taking for a number of years at Hamilton, one and two specimens in a season. It was moderately plentiful in one locality at London during the early part of July, where I secured about a dozen and a-half specimens of it. It is quite variable in size and depth of shading. My specimens range from 15 to 25 mm. in expanse of wing, the smallest males being, as a rule, the lightest in colour.

Sericoris bipartitana, Clem.

Pœdisca otiosana, Clem.

Semasia signatana, Clem.

Argyresthia andereggiella, F. V. R.

Laverna subbistrigella, Haw.

Butalis impositella, Zell.

THE SYSTEMATIC POSITION OF VARINA ORNATA, NEUM.*

BY A. S. PACKARD.

For a specimen of this most interesting moth I am indebted to Mrs. Slosson, and after an examination of it I am unable to find any Bombycine characters, except the heavily pectinated antennæ. In Prof. Smith's List of Lepidoptera it is placed in the Liparidæ between Artaxa and Lagoa, though it bears no resemblance to these moths except in the shape of the antennæ. It has also been regarded as allied to the Cochliopodidæ. Prof. Smith has recently stated that it is a synonym of *Acherdoa ferraria*, Walk. (See CAN. ENT., xxiv, 135, 1892). It appears from its heavily pectinated antennæ to belong among the Noctuo-Bombyces, and all its characters indicate its affinities with the Noctuina. On denuding the head, the front is seen to be very full and convex, and those who claim that the characters of the head are useless in distinguishing families, we would refer to this case, as no Bombycine moth with which we are

*Papilio iv., 91, 1884.

acquainted has such a full, protuberant front. The palpi are also truly noctuid in shape, the joints being very distinct, the 3rd joint long and slender compared with those of the Bombyces. The forewings have a well-developed dot and reniform spot, genuine Noctuid marks, and the hind wings have the peculiar gloss of Noctuid moths. The venation of the wing is unlike that of the Liparidæ and Cochliopodidæ, and entirely unlike that of the Notodontidæ. There are 4 branches of the median vein, and their arrangement and that of the subcostal veinlets appears to be characteristically Noctuid.

I am confirmed in the view that this moth belongs among the Noctuids by the following observations of Mrs. Slosson, who was fortunate enough to hatch out the larvæ, and to find that they are semiloopers, like the freshly-hatched larvæ of many Noctuids.

"I captured at light, in the spring of 1891, a *Varina ornata* ♀ and placed her at once in a box made for the purpose. But when I opened the box for examination I found to my chagrin, that I had unfortunately closed the lid upon my treasure and crushed her to death. As the abdomen seemed somewhat distended, I pressed it gently, and had the satisfaction of seeing two eggs drop out. I could secure no more. As it was late at night and my light was poor, I deferred close examination of the eggs. The next day I was attacked with neuralgia in the eyes, and was quite unable to use a magnifying glass. On the 6th or 7th day the eggs were hatched. I was still suffering, and could make no close observations. But one thing was plainly to be seen, the larvæ were "loopers"! This I could see for myself, and an unscientific friend who looked at them through a lens at once declared them to be "measuring worms." Knowing nothing of the food-plant, I sent out for leaves of the various trees and herbs growing near. But the larvæ would eat nothing. On the third day, though still alive they were very weak. I placed a bit of palmetto—*Sabal serrulata*—in their glass, and they at once crawled feebly upon it, and began nibbling its surface. But it was too late, and not knowing how vastly important to science would be a prolongation of their existence, they quietly passed away. I regretted deeply my lost opportunity of settling finally the proper position of this interesting moth. But I can but consider this proven fact of the young larvæ's being loopers a very significant one."

CATOCALINE MOTHS FROM GEORGIA.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the collection of the Bremen Museum are a number of *Noctuidæ Catocalinæ*, brought by Norwich, many years ago, from the vicinity of Savannah, Georgia, and belonging to species for the most part new to me. Nearly all are now identified by me as described by Guenée in the Species General, and their notice here can hardly fail to be of interest. I have previously remarked upon the fact that, as we progress southwardly, we are met by an increase in the number of species of Catocaline Owlet Moths, while the *Noctuinæ*, or typical *Noctuidæ*, diminish; the metropolis of the former seems to lie in the Tropical, of the latter in the North Temperate Zone. But already in the Southern States we meet with many species of Banded Owlets, which seem absent in Canada and the Northern United States.

Grammodes, Guen.

Guenée describes in the Species General three North American species, *Smithii*, *Similis* and *Consobrina*, under the generic term *Ophiusa*, Tr., a name which, being pre-occupied in zoology, cannot be retained. These three species, then unknown to me in nature, I referred temporarily to the genus *Grammodes*, in the Buffalo Check List, 39, 1876, as also in the New York Check List, 39, 1882. This course is followed by the Philadelphia Check List, 57, 1891. At this writing I have not the necessary means or material to satisfactorily review the generic position of the species described in the present paper. Of Guenée's three American species of *Ophiusa*, two, *Smithii* and *Consobrina*, are now identified by me in the Norwich collection. These two are closely allied, so much so that, at the first glance, they seem the same, though readily distinguished. Under these circumstances it seems inexplicable to me that Guenée should place them in two distinct groups, and should interpolate a group and follow *Smithii* with a species, *similis*, which, from the description, must differ somewhat widely in appearance. The two species before me seem allied to *Euclidia cuspidea*, while in the dusty-gray colour, texture and vestiture, they resemble *Drasteria*. They are distinguished by the fine, even, cleanly-cut and very distinct median lines. All the species here included have a deep brown or blackish, apical, liturate mark. That they will remain under this generic title, which is only a substitute for *Ophiusa*, as used by Guenée for them, does not seem probable to me.

1. SMITHII, Guen., Sp. Gen., VII., 266, 1852, *Ophiusa*.

The forewings are powdery light ash-gray over brown, with a slight violaceous reflection. The brown colour appears as a diffuse deeper shading before the t. a. line, and again before the t. p. line over the outer portion of median space. T. a. line narrow, brown, slightly bent and relieved outwardly against the gray median space. T. p. line similar in appearance, but very cleanly cut and even, forming two angles outwardly; the first and most prominent opposite the cell, the second projection on the interspace above vein 1; thus the line forms three subequal scallops, the upper one shallower and more oblique, the middle one the longest. A deep brown, inwardly oblique, shaded apical mark, terminating in a second linear one, which appears as if dislocated and turns outwardly. Hind wings obscure brown, a little dusted with grayish on the outer margin before the angle. Beneath both wings concolorous, paler yellowish-brown, with a faint darker median line and discal point. On primaries above the brown reniform is feebly marked. Body concolorous. Two female specimens examined, expanding 37-38 mil. In Mus. Brem.

Guenée names this species for one of the authors of the "Insects of Georgia."

2. CONSOBRINA, Guen., Sp. Gen., VII., 1852, *Ophiusa*.

Almost exactly like *Smithii*. The base of primaries somewhat darker shaded, hardly ashen; the liturate apical mark seems to run inwardly obliquely throughout its length and is uniformly preceded by a deep brown shade, appearing continuous. The t. p. line wants the second angulation and thus forms a single curve from a point opposite the cell to the inner margin. These seem the only differences in markings. Two males examined, expanding, one 40, the other only 35 mil. In Mus. Brem.

I regard it as not impossible that *Consobrina* is the male of *Smithii*. The antennæ in both are simple, the joints provided with short hairs beneath. The terminal joint of the palpi appears to be shorter in *Consobrina*, and probably really is so, but this feature might be sexual. Guenée does not note the sex of his material. In ornamentation the only differences I find are in the apical shade and the t. p. line; this latter character alone is strongly marked and leads one to suspect a distinct species. The difference in size noted by Guenée (p. 268) does not exist. In this group of moths the male is not infrequently much larger than the

female, but is inconstant in size of wing. One specimen of *Consobrina* is in this respect smaller than *Smithii*. As to the difference in shading, it appears to me quite unimportant and not unlikely a variable character.

3. SIMILIS, Guen. Sp. Gen. VII., 267, 1852. *Ophiusa*.

"40 mil. Wings entire, powdery, of an even violaceous ashen, shaded here and there with reddish; with the two median lines hardly visible, very fine and, between them, another similar line bent in an opposite direction to the t. p. line and nearly touching the latter at either extremity, the whole hardly distinct. A black apical mark, composed of two little triangles united at apices, a little shaded interiorly. Hind wings light brown, with the fringes ashen. Beneath of the same brown, with indistinct line and lunule.

Var. APICALIS, id. The arcuate median line largely shaded with blackish exteriorly."

This species is unknown to me. It cannot be the succeeding form owing to the given colour, the triangulate apical spots, and the arcuate median line.

4. CONCOLOR, n. s.

♂ Entirely of a light chocolate brown. The forewings unicolorous, with a slight frosty violet reflection, without any perceptible markings or any darker shadings, except the liturate dark brown apical mark, which is oblique, of nearly uniform width and subcontinuous. Hind wings plain brown, the outer edge and fringes very slightly shaded with ashen. Beneath paler, concolorous yellowish-brown, with faint traces of one or more common lines and discal dots. Palpi slightly exceeding the front. Antennæ simple, the joints beneath with short hairs. One specimen, expanding 42 mil., in Mus. Brem.

♀ Somewhat darker than the male. The frosty violaceous shade obtains strongly over basal half of primaries and allows an uneven darker t. a. line to be faintly visible. At the centre of the wing, in the place of the median shade, is a straight sharp line of demarcation, beyond which the wing is outwardly diffusedly much darker shaded, the dark colour fading to the fringes and allowing the apical mark to be plainly visible. In one specimen the apical mark is apparently linear and dislocated in-

feriorly. Else as in the male. In one specimen there are terminal dots near the anal angle of secondaries. Two specimens, one expanding 46 mil., the other only 38 mil. Savannah, Norwich, in Mus. Brem.

Renewed examinations of the male of this prominent and well-sized species show, that in certain lights exceedingly faint traces of the t. a. line may be discerned. But the brown surface of the wing is unbroken to the eye, without lines or discal spot, and is relieved only by the distinct apical mark.

AGNOMONIA, Hübn.

1. ANILIS, Drury, II., 21, Pl. XII., 3, 1770–1775.

Sequistriaris, Hübn., Zutr., 419–20, 1825, *Agnomonia*.

Anilis, Guen., VII., 273, 1852, *Agnomonia*.

Two specimens of this not unusual species from Savannah in Mus. Brem. In this genus the apices of forewings are sharp, the short fringes usually discolorous, the external margin sinuous or straight, not rounded; the forewings have a certain lustre on their upper surface.

2. QUADRIFILARIS, Hübn., Zutr., 569–70, 1825, *Agnomonia*.

Guen., VII., 300, 1852, *Poaphila*.

Two specimens of this well-marked species from Savannah in Mus. Brem. Smaller than *anilis*, of a lighter lustrous brown. The forewings crossed by two white median stripes, narrower than in *anilis*, and continuous, whereas in *anilis* the outer band is abbreviated. *Anilis* is much stouter with the external margin sinuate, curving inwardly below the apex.

3. OBSOLETA, Grt. Proc. Bost. Soc., N. H., 417, 1876, *Poaphila*.

Quadrifilaris, var. A., Guen., VII., 301, 1852, *Poaphila*.

Of this species, taken by Dr. Thaxter in Florida, there are no specimens in the collection. According to my observation, it is decidedly distinct from *Quadrifilaris*.

4. ERASA, Guen., VII., 301, 1852, *Poaphila*.

The forewings are of a somewhat grayish or fuscous-brown with a slight lustre, darker shaded outwardly. The markings are quite indistinct,

and only traces of the transverse lines can be made out. The short fringes are tipped with whitish ; apices pointed, external margin quite straight. Hind wings without markings ; abdomen somewhat grayish. An inconspicuous species, distinguishable by the pale fringes. One male before me from Savannah, expanding 31 mil., in Mus. Brem.

Probably most of the species referred to *Poaphila* in the Species General, and in our Check Lists, belong really to *Agnomonia*. Of the species described by Guenée I have not identified anywhere *Contempta* or *Bistrigata*. *Poaphila sylvarum*, in the collection before me, may be considered typical of its genus. *Flavistriaria*, *perplexa*, and *herbarum*, determined by me in Coll. Mus. Brem., are apparently related to *Phurys* and *Celiptera*, as also is *Bistrigata* from Hübner's figure. I have described two species in Bulletin, U. S. Geol. Survey, IV., 184, 185, which may also belong to *Agnomonia*. The types are in Coll. Brit. Mus. A name to be admitted must be sanctioned by figure or description. But what are we to do with the bad descriptions of the British Museum Lists? Can the supposed types of Mr. Walker be admitted as evidence? In cases where they in any way contradict the description I think certainly not.

PHURYS, Guen.

1. FLAVISTRIARIA, Hübn., Zutr. 555–6, 1825, *Crochiphora*.

Guen., VII., 302, 1852, *Poaphila*.

The forewings are grayish-brown, with a faint discal mark and a rigid ochre-yellow subterminal band, followed by a narrower dark brown shade line. Two specimens before me, which belong evidently to the species described by Guenée, but do not quite agree in shape of wing and appearance with Hübner's figure, while the only markings correspond, and these are so simple that it must be the species. The identification of *flavistriaria* has led me to that of Guenée's *perplexa*, described comparatively in the Species General. Guenée changes the specific name to *Flavistriaris*.

2. PERPLEXA, Guen., VII., 303, 1852, *Poaphila*.

Glans, Grt., Proc. Bost. S., N. H., 416, 1876, *Phurys*.

This species differs from *Flavistriaria* mainly by the concolorous pale gray colour, while the subterminal stripe has less yellow, the dark brown

line predominating. Faint indications of an uneven t. a. line. The discal mark almost obsolete. Faint terminal dots may be discerned. Hind wings gray without lines. Two specimens, Savannah, Georgia, in Mus. Brem.

The more of our species of Catocaline Noctuids, belonging to the group of which *Drasteria* may be considered typical, the so-called "Grass Moths," I have become acquainted with, the more do I see the necessity for their generic revision. But the material I have had at any one time has been so small and fragmentary that I have been unable to attempt it.

DESCRIPTIONS OF CERTAIN LEPIDOPTEROUS LARVÆ.

BY HARRISON G. DYAR.

Colias Behrii, Edw.

Egg.—Spindle shaped, a little contracted just before the tip, with low longitudinal and transverse ridges, which divide the surface into shallow, rectangular parallelograms. Length, 1.3 mm.; width, .6 mm. The eggs are laid singly on the upper side of the leaves of a species of ground huckleberry, its food plant.

First stage.—Head rounded, dark brown; width, .25 mm. Body of normal shape, sordid whitish, apparently without marks; minutely pilose.

Fifth stage.—Head rounded, very slightly bilobed, slightly reticulated with brown; no other marks; width, 2 mm. Mouth parts brown; ocelli and jaws black. An even, pinkish white dorsal line, very narrowly black bordered, runs the length of the body, tapering a little at each end, obsolete on joints 2, 3 and 13. A broader, even, subdorsal line, nearly white on the edges, salmon coloured centrally, and bordered above by a black lunate shade on the anterior part of each segment. A similar, very even substigmatal band, pinkish centrally; the bordering black shades surround the spiracles and are larger and more diffuse than those above the subdorsal band, but very faint on the thoracic segments. A faint, even, lateral band, paler than the ground colour, which is probably some shade of green in living specimens. Spiracles white, the pair on joint 12 larger than the others. Thoracic feet testaceous.

Pupa.—This seems not distinguishable from that of other species of Colias. Thorax large, the back arched and cases prominent; abdomen

tapering; cremaster short, square at tip, flattened and firmly adhering to the silken web. It appears to have been yellowish-green, a lateral pale line on the abdomen, the antenna cases marked with pink.

Described from alcoholic specimens collected by Mr. J. B. Lembert in the High Sierras of California. Concerning the habits of this insect, Mr. Lembert writes :—"July 27th, about nine or ten in the morning of the third day of search, I discovered the food-plant of the hardy little mountaineer. His little queen fluttered into the grass on the meadows at the base of Mt. Gibbs. When she had laid about five or six eggs, she flew on to the dry moraine and sandy hills to eat flowers, and in the meantime another took her place. The eggs were deposited on the low growing huckleberry vine, which is lower than the grasses that it grows among, affording protection to the eggs and larvæ against the dews and frosts that prevail at any day on the highland meadows. The males outnumber the emales six to one, according to my catch, as the latter feed on the flowers growing on the old moraines which rise up out of the meadows, and only fly to the meadows to deposit their eggs.

When the larvæ get large they hide, and in the first stage they are almost invisible. When ¼ inch long they are semi-transparent; when ⅓ inch, they get about the colour of a lightly bruised apple and worm-like, without spines. They greatly resemble the withered huckleberry ruit. The eggs when first laid are glistening white, then dull white, and finally greenish. They hatch in six days."

Ichthyura vau, Fitch.

Egg.—Hemispherical, flat below, the shell semi-transparent white. Under the microscope it appears covered with small, slight depressions, closely crowded together and forming obscure roundedly hexagonal reticulations; diameter, .9 mm. Laid singly, or as many as seven together on the under side of a leaf. The larva hatches by eating a piece off of the vertex of the egg, which may remain attached to the shell like a circular trap door.

Third stage.—Head slightly bilobed, rounded, clypeus depressed, hairy, especially on the lower part; shining black throughout. Cervical shield and anal plate blackish. Body vinous-brown, with a broad band of sordid yellowish-white, absent on joints 5 and 12, and containing a

triple brown line. Subventral space, from the spiracles to the feet, irregularly mottled and streaked with yellowish. Feet black. The minute piliferous tubercles of rows 1 and 2 are stained yellow. Width of head, 1.2 mm.

Fourth stage.—Head round, full, pilose, blackish-brown, paler above the mouth and slightly shiny; width, 1.8 mm. Body largely obscure, purple-brown, this colour forming a triple dorsal line and covering the whole lateral area to the feet. Dorsum grayish-white between the lines, and this colour also obtains in a rather broad lateral line and minute mottlings all over the brown area, which are distinct without a lens only subventrally. Thoracic feet black, abdominal ones concolorous with the body. The tubercles are very inconspicuous, but row 1 is marked by little yellow dots through the whole length. The hairs are fine and short, pale, those arising from the body very much shorter than those from the tubercles. In another example joints 5 and 12 were seen to be slightly enlarged dorsally and coloured purple-brown, while all the turbercles of rows 1–5 were obscurely yellow.

Fifth stage.—Head slightly flat in front, blackish-brown, pale-purplish in the sutures; labrum sordid white; width, 2.3–2.5 mm. Body purplish-brown, marked as before, but the pale gray parts are slightly obscured by minute brown mottlings and the yellow piliferous tubercles are small but very distinct. Each bears its one hair and the rest of the body is minutely pilose. There are traces of a black bisected cervical shield; no distinct anal plate. In another example, the whole surface of the body was marbled with pale gray, greatly obscuring the lines, though the yellow tubercles were still distinct.

At maturity the body was sordid white, thickly mottled with pale brown, forming a faint triple dorsal, single subdorsal and stigmatal lines; spiracles black; tubercles orange.

Food-plant.—Species of willow (Salix). The larvæ live singly, each tightly wedged in a little house formed of leaves and silk, from which they come forth to feed. Larvæ from Boston, Mass.

NEBRASKA MYRIAPODA.

BY F. C. KENYAN, UNIVERSITY OF NEBRASKA.

Heretofore nothing concerning the Myriapoda of Nebraska has been published. Hence the following short list of species will not be without interest :—

Lysiopetalum lactarium, (Say).

Parajulus canadensis, (Newp).

P. impressus, (Say).

Spirobolus marginatus, (Say) Newp.

Leptodesmus floridus, Wood.

Fontaria virginiensis, (Drury) J. E. Gray.

Paradesmus erythropygus, (Brandt) Wood.

Polydesmus canadensis, Newp.

P. granulatus, Say.

Scolioplanes bothriopus, (Wood) Mein.

Geophilus cephalicus, (Wood) Mein.

Geophilus bipuncticeps, Wood.

Scolopocryptops sexspinosus, (Say) Newp.

Scolopendra woodii, Mein.

Archilithabius malterris, sp. n.—Prosternal teeth, 2 + 2. Ocelli, 10–12, arranged in 3 rows. Antennal articles, 21. Coxal pores, 2, 3, 3, 2–3, 3, 4, 3, or 10–13, round. Spines on the first pair of legs, 2, 3, 1; on the penultimate pair, 1, 3, 3, 1; on the anal pair, 1, 3, 2, 0. Claw of female genitalia entire. Slender, light chestnut, head darker. Joints of antennæ rather long. Length, 12–13 mm.

From the Bad-lands, Sioux Co.

Archilithobius nebrascensis, sp. nv.

Prosternal teeth, 2 + 2. Ocelli, 11–15, arranged in 3 rows. Antenna; articles, 20–21. Coxal pores, 2, 3, 3, 2–3, 4, 4, 3, or 10–14. Spines on the first pair of legs, 1, 1, 1–1, 2, 1; on the penultimate pair, 1, 3, 3, 2; on the anal pair, 1, 3, 2, 0. Claw of female genitalia bipartite. Rather robust. Orange-brown; head darker, smooth; shortly pilose. Head subrotundate. First scutum, large, subquadrate. Antennæ, long, tapering, shortly pilose; articles long. Length, 11 mm.

A. dorsopinorum, sp. nv.

Prosternal teeth, 2 + 2.. Ocelli, 11–15, arranged in 3 rows. Articles of the antennæ, 21. Coxal pores, 3, 4, 4, 3–4, 5, 5, 4, or 14–18. Spines on the first pair of legs, 1, 2, 1–2, 3, 1 ; on the penultimate pair, 1, 3, 2.1–1, 3, 3, 2, on the anal pair, 1, 3, 2, 1. Penultimate pair of legs armed with 2 claws ; the anal legs with one claw. Claw of female genitalia tripartite.

Body depressed. Light brown ; head a little darker. Anal legs only slightly crassate.

This seems to be related to Bollman's *elatus*, but is distinguished from that species by having the ocelli and the coxal pores more numerous, and the spines of the anal legs differently arranged.

A. Bruneri, sp. nv.

Prosternal teeth, 2 + 2. Ocelli, 9-12, arranged in 3 rows. Antennal articles (♂)20–(♀)21. Coxal pores, round, 2, 3, 3, 2–3, 4, 4, 3, or 10–14. Spines on the first pair of legs, 0, 1, 1–2, 2, 1 ; on the penultimate pair, 1, 3, 3, 2 ; on the anal pair, 1, 3, 3, 1. Penultimate legs armed with 2 claws ; the anal pair with one. Claw of female genitalia entire.

Scarcely robust. Light chestnut ; head and first scutum darker ; pilose. Head subrotundate ; longer than broad. Antennal joint, head-able, [illegible] close. Body tapering anteriorly. Anal legs not crassate, [illegible] first sulcate beneath, the last two joints decidedly flattened on [illegible] side.

A. [illegible], sp. n.

Prosternal teeth, 2 + 2. Ocelli, 10–14, arranged in 4 rows. Antennal [illegible] Coxal pores, 3, 4, 4, 4, 5, 5, 4, or 17–18 ; round. Spines on the first pair of legs, 1, 2, 1, 2, 1 ; on the penultimate pair, [illegible] Anal and penultimate legs each armed with [illegible] claws. Claw of female genitalia entire. Slightly [illegible] Head subrotundate ; longer than [illegible] Anal legs slightly crassate [illegible]

CORRESPONDENCE.

PARNASSIUS CLODIUS AND P. SMINTHEUS.

SIR,—Good specimens of these species are generally easily separated, but occasionally specimens are taken the identity of which it is difficult to decide. Mr. C. de Blois-Green, of Victoria, B. C., who has taken both specimens in large numbers, has drawn my attention to a character which he finds reliable in all instances. This is that in *Clodius* the antennæ are uniformly black, whilst in *Smintheus* they are ringed with white. Of course, when the abdominal pouch is attached, there is no difficulty in separating the female of *Clodius* with its large pouch from *Smintheus* with its small keel-shaped appendage. The value of these abdominal pouches has been well-worked out by Mr. H. J. Elwes in an exhaustive paper published in the Transactions of the Entomological Society of London. Some specimens received from Mr. de Blois-Green were sent to Dr. H. Strecker, and his opinion asked as to the value of the character based on the colour of the antennæ. His reply, which I think will be read with interest by lepidopterists, is as follows:—

"Your letter and the remnants of the *Parnassius* received. The latter are only *Clodius*, of the form found in the State of Washington and western British Columbia; those further south (California) are not as large nor as brightly coloured, as a general thing. Your correspondent is right in laying stress on the black antennæ. *Clodius* belongs to a group and is allied to some sub-group having black antennæ and large pouches. They embrace *Nordmanni*, from Armenia; *Clarius*, from W. Siberia; *Eversmanni*, from Alaska and Siberia; *Felderi*, the Amoor; *Mnemosyne*, Germany and Switzerland, etc.; *Stubendorfii*, Siberia; and *Glacialis*, Japan; whereas *Smintheus* has white-ringed antennæ, and its allies, distinguished further by the keel-shaped pouch, are *Apollo*, Germany; *Hesebolus*, Mongolia, etc.; *Nomion*, Siberia; *Jacquemonti*, Himalayahs, etc., with white-ringed antennæ also; but there are sub-groups allied to these with the same keel-like pouch as *Apollinus*, Tartary; *Honrathi*, Turkestan, etc., that have all black antennæ, so there is no rule without an exception. Our *Parnassius*, according to my views, are but three species:—

1. *Smintheus*, Dbldy—Hew.
2. *Clodius*, Men.
3. *Eversmanni*, Men.

All the others, such as *Thor*, *Menetriesii*, etc., are but varieties or aberrants. It would be easy to make fifty such species of *Smintheus* alone, if you took them at various altitudes and locations. Some butterflies, as, for instance, *Papilio Turnus*, of which I have great giants from North Carolina, Georgia, etc., expanding 5½ inches, while others from the White Mountains spread only 2½ inches, and there are all sorts of shades of yellow, orange, brown and black, and yet who would think of making a dozen species of these? I notice that Mr. W. H. Edwards includes *Par. Nomion* in our fauna. I think somehow he must be mistaken, unless possibly it was caught in Alaska."

HERMAN STRECKER."

Feeling sure that the above letter will be of interest to many of our readers, I have obtained Dr. Strecker's permission to publish it.

JAMES FLETCHER, Ottawa.

UNIDENTIFIED BOMBYCIDS.

SIR,—Messrs. Dyar and Neumoegen have struck a snag in their work, according to their statement in CAN. ENT. for May, 1893. I am glad that I am able to help them over one part of it. Of the "unidentified names," *Saligena personata* has been long since referred as a synonym of *Ryssia rutor*, and I am able to confirm the correctness of the reference. *Scribonia elegans* has been proved a noctuid, and an *Arctiid*. As *Scribonia* or *Dryocampa rubicunda* it is a well-known insect. Messrs Neumoegen and Dyar are following Mr. Kirby's use of generic terms very closely. It would be a matter of some interest if they would inform us whether, in the case of Hübner's [illegible] they have independently [illegible] or whether they simply follow Mr. Kirby's [illegible] of the working entomologist [illegible] it is not impertinent to ask why they [illegible]

JOHN B. SMITH.

[illegible] Institute of Jamaica, [illegible] has resigned on account [illegible] Jamaica, West [illegible] in his new position, [illegible] valuable communications [illegible]

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COMMENTS ON MR. VAN DER WULP'S RECENT DIAGNOSES OF NEW SPECIES OF MEXICAN PHASIIDÆ, GYMNOSOMATIDÆ, OCYPTERIDÆ, AND PHANIIDÆ.

BY C. H. TYLER TOWNSEND.

Mr. F. M. van der Wulp, the well-known Dutch dipterologist, has recently published, in the *Tijdschrift voor Entomologie*, vol. 35, pp. 183–195, short diagnoses of a large number of new species and several new genera of Mexican Tachinidæ sens. lat. Of these, there are 33 new species and 4 new genera which belong to the above four groups. Of such well-known and well-worked genera as *Trichopoda*, there are 4 new species; of *Hyalomyia*, 10 new species; of *Cistogaster*, 8 new species!

This material was received by Mr. van der Wulp from the editors of the Biologia Centrali-Americana, but too late to be included in his parts on the above groups, which had already been published. These forms are to be fully described at some future time in a supplement to the Biologia. No localities whatever accompany the short diagnoses.

I desire to offer the following notes on these species:—

PHASIIDÆ.

Trichopoda nitidiventris, ♂, is described as having the cilia of hind tibiæ black with yellow tips. This must be a quite divergent form, since it is the first one known with the tibial cilia varicoloured. It is also very distinct from the previously known forms in having the abdomen shining black with a rufous anus

T. alipes, ♂, seems to be different from the described species, inasmuch as the tip of the wing, as well as the hind border, is broadly hyaline.

T. squamipes, ♂, seems quite distinct in its yellowish rufous scutellum and abdomen. *T. histrio*, Wlk. (*trifasciata*, Liv.), is the only species known to me with a yellowish, or other than a nearly black, scutellum.

T. nigripes, ♂ ♀, must be near *T. pennipes*. It is smaller, however, and the face and front are whitish instead of golden-yellow.

HOMOGENIA, nov. genus, v. d. W.

This genus must be closely allied to either *Xysta*, or *Phasia*. It is described as similar to *Trichopoda*, but with apical cell open, and cilia of hind tibiæ short and less conspicuous. This name is preoccupied (Homogenes) by Thomson in Coleoptera. I propose, therefore, that the genus be known as *Trichopododes*, from its close relationship with *Trichopoda*, as shown by its somewhat less ciliate hind tibiæ. Three species of it are described, from 7 to 11 mm. long. They are: *Trichopododes rufipes*, ♂ ; *T. latipennis*, ♂ ♀ ; and *T. nigroscutellata*, ♂.

Hyalomyia munda, ♂, seems distinct in the whole body being thickly covered with a yellowish-gray tomentum.

H. villosa, ♂, also seems distinct in its dense yellowish pilosity.

H. hebes, ♂, is apparently distinct in the shorter yellow pilosity.

H. ochriceps, ♂, seems very close to *H. æneiventris*, Will.

H. argenticeps, ♂, is also apparently very near *H. æneiventris*, Will. I do not see why the front in the above five male specimens is described to be as broad as, or broader than, the eyes, unless the anterior triangular portion of the front is meant. But this interpretation is precluded by the next five specimens being indicated as females, all of which are described as having the front trigonal and the eyes but little separated on the vertex. I do not know of any *Hyalomyias* which have the front as broad as the eyes.

H. nigrens, ♀, does not apparently differ much from *H. punctigera*. Twns., so far as can be gathered from the short description.

H. piceipes, ♀, may be a valid species.

H. mœrens, ♀, is quite near *H. purpurascens*, Twns. The wings, however, of the latter are not brown, but whitish.

H. umbrosa, ♀, is a similar but larger species.

H. umbrifera, ♀, is allied to *H. punctigera*, Twns.

GYMNOSOMATIDÆ.

Cistogaster ruficornis, ♂, seems to be *Gymnosoma filiola*, Liv., ♂.
C. melanosoma, ♀, is probably *C. pallasii*, Twns.
C. subpetiolata, ♀, seems only a variety of *C. pallasii*, Twns.
C. propinqua, ♀, seems very near *C. immaculata*, Mcq., ♀.
C. griseonigra, ♀, may be same as *C. occidua*, Walk., ♀.
C. ferruginosa, ♂, is probably *C. immaculata*, Mcq., ♂.
C. hirticollis, ♂, is doubtless *C. occidua*, Wlk., ♂.
C. variegata, ♂, seems to be only a variety of preceding.

OCYPTERIDÆ.

Ocyptera signatipennis, ♂, is probably *Ocyptera euchenor*, Wlk.

XANTHOMELANA, nov. genus, v. d. W.

This genus must be very similar to *Ocyptera*, differing only by the curved, not angulated, fourth vein, and the shortly petiolate apical cell, with the petiole ending at the wing's tip. This name is also preoccupied (Xanthomelon, Mart., Moll., 1860), and may be changed to XANTHOMELANODES. Six species are described, from 4½ to 7½ mm. long. They are:—*Xanthomelanodes articulata*, ♂; *X. rubicunda*, ♂ (?); *X. dorsalis*, ♂ ♀; *X. trigonalis*, ♂; *X. gracilenta*, ♂ ♀; and *X. anceps*, ♂.

PHANIIDÆ.

CLINOGASTER, nov genus, v. d. W.

This genus must bear a striking resemblance to *Hemyda*, differing almost wholly in the short petiolate, instead of open, apical cell, and in the fourth vein being bent at an angle. It belongs apparently in the *Ocypteridæ*, however, and not in the *Phaniidæ*, as indicated by the elongate and incurvate abdomen.

Clinogaster notabilis, ♂, type of the genus, must be very similar in size and appearance to *Hemyda aurata*.

PENTHOSIA, nov. genus, v. d. W.

This genus is erected by Mr. van der Wulp for *Scopolia satanica*, Bigot (Ann. Soc. Ent. Fr., 1888, p. 254). Mr. van der Wulp has been kind enough to send me a specimen of this species, labelled: "Omilteme, Guerrero, 8,000 ft. July. H. H. Smith." It is a well-marked genus, bearing much structural resemblance to *Ocyptera*, but differing at once in its well-formed palpi, and its intensely and evenly black colour. It should, I think, also be included in the *Ocypteridæ*. Both this genus and *Clinogaster* exhibit a closer relationship with *Ocyptera* than do any of the other American genera of *Ocypteridæ*, by virtue of their petiolate apical cell.

To sum up:

The above 4 new genera appear to be quite distinct and valid. The species of *Trichopoda* appear to be distinct from those previously described. The *Hyalomyias*, at least the most of them, are doubtless valid species. This is not to be wondered at, since the genus *Hyalomyia* is rich in forms. It is more remarkable, however, that 4 new species of *Trichopoda* should turn up at this late day, and in a single collection.

When we come to the genus *Cistogaster*, and find 8 new species, we may well be astonished. This genus has never before been turned up in Mexico, or anywhere in tropical America. Though most numerous in individuals in most parts of the United States, there were heretofore but 3 species to be distinguished, and these might easily all be considered but forms of a single variable species Bearing this in mind, we are wholly unprepared for such a sudden increase in the number of species, and may well doubt their validity. With the single exception of the first species (*C. ruficornis*), they are probably all referable to the three already known species. From the description of *C. ruficornis*, I cannot resist the conclusion that Mr. van der Wulp has mistaken *Gymnosoma filiola*, Lw., for a *Cistogaster*.

Of course it is difficult, and to a certain extent uncertain, to judge of these forms from the brief diagnoses alone that have so far appeared. For this reason I feel called upon to delay the publication of Part I. of the Monograph of North American Tachinidæ, referred to in *Psyche*, Jan., 1893, until the Biologia supplement appears giving fuller descriptions of these species with drawings.

If any of the above comments prove to be erroneous in their conclusions, I shall be most happy to amend them.

DESCRIPTION OF THE GRUBS OF CHRYSOMELA EXCLAMATIONIS.

BY C. H. TYLER TOWNSEND.

This species is quite common in New Mexico, where it feeds on the native sunflower (*Helianthus sp.*). On August 7, 1892, at Belen, N. Mex., I found the native *Helianthus annuus* badly infested with the adults and numerous light green grubs of this species, which were eating the leaves extensively. From these grubs the following description is drawn :—

Larva (about full grown).—Length, 5½ to 7 mm.; greatest width, 4 to 4½ mm.; greatest thickness, 3 to 3½ mm.; width of prothoracic segment, 2 to 2½ mm.; of head, 1½ mm. Colour wholly light green, except head and legs, which are slightly tinged with brownish; eyes, antennæ and jaws, brown. Shape subpyriform, curvate, very strongly convex dorsally; slightly concave ventrally in lateral profile, but a little convex in longitudinal profile;

tapering anteriorly to head, stout posteriorly, coming suddenly to a point at anal extremity. Transversely wrinkled, both above and below. Consisting of thirteen segments, head chitinous, other segments fleshy, the prothoracic segment hardly less so. Nearly naked, clothed only with a few very sparsely distributed hairs, somewhat more numerous on the prothoracic segment and head. Head semi-circular in outline from above, not retracted, narrower than prothoracic segment; second, third, fourth, and fifth segments each successively wider than its predecessor, and increasing at about the same rate; segments 6 to 8 about same width, a little wider than 5; 9 to 12 narrowing successively, each with greater rapidity than its predecessor; 13 very small. Prothoracic segment a little longer than head; segment 3 (in wrinkled condition of alcoholic specimens) about two-thirds length of second, the following segments increasing very slightly to the somewhat greater length of 6 to 9; 10 and 11 successively a little shorter; 12 and 13 very short, of about equal length, 13 bearing a blunt subbifid anal proleg. All the segments with a few short hairs on lateral edges, varying in number usually from 3 to 5, second segment and head with more. Eyes represented by six prominent brown or blackish, often glistening, simple eyes on each side of the head, four of them arranged in a transverse diamond just posterior to antenna and a little removed inwardly from edge of head; the other two situated on edge of head, more separated, one ventrad of the antenna and the other ventrad of the upper four. Antennæ small, situated in an excavation and somewhat sunken, 3-jointed; first joint stout, cylindrical, hardly as long as broad; second joint less than one-half the diameter of first, not as long: third joint nearly as wide as second, hardly as long. Labrum twice as wide as long, front border hollowed out, bearing two bristles on its dorsal surface, clypeus appearing as a long transverse narrow strip posterior to labrum. Mandibles stout, 5-toothed on the blunt apical portion. Maxillæ well-developed. Maxillary palpi 4-jointed, first joint short; second a little shorter than first, but nearly same diameter; third longer than first, narrower than second, cylindrical; fourth conical, almost as long as third, not as wide at base as third, and tapering evenly to a point. Labial palpi 2-jointed; basal joint stout, tubercular, hardly as long as wide, subcylindrical; the second joint conical, hardly as wide at base, and hardly longer than basat joint. A spiracle (the mesothoracic) on lower anterior portion of third segment; 5 to 12 with a spiracle on lateral portion dorsad of the lateral

ridge which separates the tergum from the venter on these segments; the thoracic segments extend farther ventrad on the sides. Legs apparently 4-jointed, corneous, first two joints more or less amalgamated, fourth shorter than third, terminated by a hooked claw.

Described from many alcoholic specimens. Belen, N. Mex. August 7.

A LIST OF SPECIES OF DIPTERA FROM SAN DOMINGO.

BY S. W. WILLISTON, LAWRENCE, KANSAS.

Some years ago I received a small collection of diptera from San Domingo, made by Mr. F. Frazar, a list of the species of which it is composed I herewith give. Hitherto scarcely two score species have been recorded from the island. The habitats followed by an exclamation point are given from specimens which I have examined:—

1. *Odontomyia*, sp.
2. *Cyphomyia*, sp.
3. *Lepidoselaga crassipes*, Fabr. South America! Mexico! Cuba.
4. *Chrysops costatus*, Fabr. South America! Cuba.
5. *Chrysops Frazari*, Will.
6. *Tabanus parvulus*, Will.
7. *Tabanus fenestra*, Will.
8. [illegible] Fabr. St. Thomas.
9. [illegible] Williston. Cuba!
10. [illegible] Will. Cuba!
11. [illegible] Will.
12. [illegible] Mexico. Honduras. Porto Rico.
13. [illegible]
14. [illegible]
15. [illegible] Cuba! Brazil! Porto Rico.
16. [illegible] South America! Cuba.
17. [illegible]
18. [illegible]
19. [illegible]
20. [illegible] Mexico!
21. [illegible]
22. [illegible] Porto Rico.
23. [illegible]
24. [illegible] Mexico. United States! Port Rico.
25. [illegible]

26. *Volucella obesa*, Fabr. Cosmopolitan.
27. *Pteroptila cincta*, Drury. Jamaica.
28. *Phrissopoda praeceps*, Fabr. South America.
29. *Lucilia*, sp.
30. *Compsomyia macellaria*, Fabr. Brazil! Mexico! United States!
31. *Dexia*, sp.
32. *Morinia*, sp. nov.
33. *Limophora*, sp.
34. *Belvosia Van der Wulpi*, Will.
35. *Blepharipeza leucophrys*, Wied. Brazil! United States! Porto Rico.
36. *Jurinia*. Two species.
37. *Jurinia apicifera*, Walker. United States!
38. *Trichopoda pennipes*, Fabr. Brazil! United States!
39. *Trichopoda*, sp.
40. *Sipedon macropus*, Walker. Cuba. Jamaica. Porto Rico.
41. *Calobata lasciva*, Fabr. South America! Cuba! United States! Porto Rico.
42. *Notiphila*, n. sp.

Fem. Flavo cinerea, facie flava, antennarum articuli tertii basi rufa, thoracis dorso vittis quinque humerisque brunneis; abdomen brunneum vitta media maculisque cinereis; pedes nigri, tibiis tarsisque posterioribus et tibiarum anticarum basi apiceque luteis.

FITCH'S TYPES OF N. A. MEMBRACIDÆ.

F. W. GODING, M. D., PH. D., RUTLAND, ILLINOIS.

During a recent visit to the city of Washington, through the kindness of Prof. C. V. Riley and his courteous assistants, I had the pleasure of examining typical examples of some of the Membracidæ described by Dr. Asa Fitch, the labels being in Dr. Fitch's own handwriting. Each specimen is numbered to agree with those given in the doctor's manuscript note-books, now in the possession of Dr. Riley and the Boston Society of Natural History. No. 11793 and 59782 are labelled *Telamona acclivata*, Fh.; on the label he states: "like cristata, Fm., but hind lobe rounded, not angular." This is *Heliria cristata*, Fm., ♀. No. 3109 is the typical example of *Telamona querci*, Fh. It is usually seen in collections labelled *monticola*, Fab., on whose authority I do not know. It is much smaller than that species and entirely different. I believe it to be a good species. It is a male. No. 2132, labelled *Atyta irrorata*, Mels., is *Telamona*

irrorata, Godg., described first in Bul. Ill. Lab. Nat. Hist., Vol. 3. It is the only description ever published. No. 2133, labelled *Telamona concava*, Fh., ♀, and apparently identical with No. 12727, a male. There is a beautifully coloured ♀ of this species in the collection of the Department of Agriculture, light and dark blue-green.

No. 3907 is *Telamona tristis*, Fh., ♀, and another smaller example doubtless the same. With these is a *coryli*, Fh., ♂, which I believe to be the same species as suggested by Van Duzee.

No. 2152, labelled *Ledra perdita* and *capra*, Mels., is *Centruchus Liebeckii*, Godg.

No. 6276, is *Microcentrus caryæ*, Fh., ♂, and No. 1878 is ♀. This species was erroneously referred, by Fitch, to the genus *Uroxiphus*. The female is about one-fourth larger then the male.

No. 6926 is labelled *Cyrtosia fenestrata*, Fh., ♀. It is the only example I have seen that agrees with Fitch's description "tip of the thorax reaching beyond the terminal cells of the elytra." In all the examples in my own collection the tip of prothorax barely reaches the terminal cells, while Mr. E. P. Van Duzee, a careful student and successful collector, informs me that all the specimens he has seen agree with my own.

No. 11764 is labelled *Cyrtosia fuliginosa*, ♀, described and figured in Emmon's valueless work on the Insects of New York. The dorsum is dark-brown with an arcuated yellow stripe on each side; legs yellow.

No. 3038 is labelled *Cyrtosia discoidalis*, ♀; also No. 4837. Described in Emmon's work. No. 11763 is *Cyrtosia pallidifrontis* of the same author and doubtless the same.

No. 11777 = *Cyrtosia maculifrontis*, and No. 4536 = *Cyrtosia cinereum* of the author's.

There are many other examples of this genus [*Cyrtosia* being preoccupied, I have given to this genus the name *Cyrtolobus*] in the collection under various manuscript names, such as *nigra*, *punctifrontis*, *tricincta*, etc., which may be distinct species, but I am inclined to the opinion that they are variations of a single species and that species may be *Vau* of Say.

There are several examples of the genus *Ophiderma* in the collection, under the manuscript names *nigripennis*, *arquata*, *rectineura*, *flaviguttula*, *bicincta*, *nigriventris*, *dimidiata*, *columbis*, etc., which I believe are variations of not more than two species.

In the collection are to be found examples of *Platycotis 4-vittata*, Say, = *4-lineata*, Germ. It is a dimorphic species, as has been proven by Prof. Riley and Mr. Ashmead, the anterior horn being present in the one and wanting in the other. Both forms are represented in the Fitch collection and in my own cabinet.

NORTH AMERICAN THYSANURA.—II.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The genus *Japyx* has been of particular interest because of the apparent absence of rudimentary abdominal appendages. One American * writer says very decidedly, "*Japyx* has none"; a well-known English † writer considers these appendages as "represented by mere groups of stiff hairs." The presence of these appendages was indicated as early as 1869, by Brauer, ‡ in his description of *Japyx gigas*. In 1889 there appeared a very important paper by Haase §, in which the rudimentary appendages are distinctly shown. These appendages can easily be seen in either of the species described below.

JAPYX SUBTERRANEUS, Pack.

1874, *Japyx*, Packard, Amer. Nat., VIII., 501.

Head quadrangular, not broader than long. Antennæ about thirty joints. Prothorax narrower than the head, truncate in front. Abdomen gradually broader behind, segments marked on each side with whitish dots, arranged in the form of a figure six; segments one to six rounded at the sides, the seventh slightly emarginate behind, posterior angles produced, not spinate, eighth subequal to the seventh, longer than the sixth, slightly emarginate behind, sides straight; ninth segment one-third the length of the eighth, posterior angles not produced; the tenth segment and forceps subequal in length, together equal in length to the four preceding segments. Right arm of the forceps broader than the left, with a stout tooth on the inner margin near the middle; in front of this tooth the inner margin is convex with four small tubercles, adjacent to the tooth, beyond the tooth the arm is concave and armed with tubercles to the apex. The left arm is broadest at base, becoming gradually narrower till a little beyond the middle, where there is a large tooth-like tubercle, in front of this tubercle the arm is concave and armed with seven to eight small tubercles; beyond the tubercle the arm is convex and armed with very small tubercles.

* Packard, Standard Natural History., II, 1884, 137.

† Lubbock., Monog. Collem. and Thys., 1873, 205.

‡ Brauer, Verh. Zool. bot. Ges. Wien, XIX., 1869, 557.

§ Haase, Die Abdominalanhange der Insekten mit Berucksichtigung der Myriopoden, Morphol. Jahr., XV., 1889, 330-435; pls. XIV.-XV.

Length, 12–14 mm. ; length of the antennæ, 4 mm. ; length of the abdomen, 8 mm. ; length of the last abdominal segment and the forceps, 2 mm.

Habitat: Kentucky (Packard), District of Columbia (Nathan Banks).

JAPYX AMERICANUS, sp. nov.

Head transverse, broader than long. Antennæ twenty-four jointed, segments one to five cylindrical, subequal ; the following segments thicker, spherical. Prothorax nearly as broad as the head, concave in front. Abdomen gradually broader behind, segments immaculate. Segments one to six rounded in the sides behind ; the seventh emarginate behind, posterior angles produced into stout spines, pointing inward ; the eighth segment equal to the seventh, subequal to the sixth, very slightly emarginate behind, posterior angles slightly produced, not spinate ; ninth segment one-fourth the length of the eighth, posterior angles slightly produced ; tenth segment and forceps subequal in length, together equal to the four preceding segments. Right arm of the forceps scarcely broader than the left, with two large tubercles on the inner margin, one just before the middle and the other beyond it ; in front of the larger tubercle the inner margin is convex with five smaller equidistant tubercles, between the larger tubercles the inner margin is straight with six equidistant tubercles, beyond the last tubercle the inner margin is concave with many small tubercles. The left arm is broadest at base, gradually tapering to the apex ; at one-third of the length from the base on the inner margin there is a large tooth, in front of and adjacent to this tooth are three smaller tubercles, which are as large as the larger tubercles of the right arm and with their apices broadly rounding ; beyond the tooth the inner margin is convex with nine feebly marked tubercles, giving a crenulated appearance ; beyond these tubercles the inner margin is simple.

Length, 14 mm. ; length of the antennæ, 5 mm. ; length of the abdomen, 10 mm. ; length of the last abdominal segment and forceps, 3 mm.

Habitat: Olympia, Washington State.

For the discovery of this interesting species science is indebted to Mr. Trevor Kincaid, of Olympia, Washington.

A third species of *Japyx* has been described from Mexico. It can be distinguished by its longer antennæ, consisting of from forty-five to forty-eight segments.

A NEW ASILID GENUS RELATED TO ERAX.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

Among the species heretofore referred to the genus *Erax* is a small group in which the first submarginal cell is divided by an oblique cross vein into two cells. The venation is similar to that of the genus *Promachus*, except that the foremost of the two apical submarginal cells is shorter, and the third vein curves forward to the costa before the apex of the wing, instead of curving backward to the hind margin beyond the apex. The examination of quite a large series of specimens belonging to this group proves that the characters above mentioned are constant, and as the genus *Erax* already contains a large number of species, it is desirable to separate as a new genus those species possessing these characters. For this group I propose the name *Efferia*, and would further characterize the genus as follows :—

Efferia, n. gen.—Third joint of antennæ provided with a distinct naked, terminal style ; wings having three submarginal and five posterior cells, the marginal, fourth posterior and anal cells closed ; third vein terminating in the costa before the tip of the wing ; front tibiæ destitute of a claw at the apex ; ovipositor of the female compressed and destitute of a circlet of spines at the tip.

Two species belonging to this group have been described from North America : *anomalis*, Bellardi (Saggio, II., 32) and *completus*, Macquart (Dipt. Exot., I , 2, 117). The last-named species has not been identified. My collection contains three apparently undescribed species, which, with *anomalis*, may be separated as follows :—

1.—Thorax destitute of a median longitudinal crest of nearly erect hairs 2
Thorax provided with such a crest ; bristles of the palpi black . . . . . *rava*, n. sp.

2.—Bristles of palpi, mystax and scutellum white 3
Bristles of palpi, scutellum, occiput above, and several in lower part of mystax, black . . . . . *anomalis*, Bell.

3.—Abdomen silvery-white pollinose, and with rather long white pile parted in the middle and directed outward . . . . . *candida*, n. sp.
Abdomen grayish-brown pollinose, and not with pile as above described . . . . . *pernicis*, n. sp.

Efferia pernicis, n. sp., ♂ . Black, the base of the tibiæ red. Pile and bristles of entire head yellowish-white, the pollen yellow. First antennal

joint nearly twice as long as the second and slightly longer than the third, style two and a-half times as long as the third joint. Pile of prothorax long, white, that of mesothorax very short, sparse, black, not forming a crest, that on the posterior part longer and partly white; dorsal stripes and spots indistinct, grayish-black; pile of pleura, legs and scutellum white, that on the abdomen short, sparse, not parted in the middle where it is largely black, elsewhere white; pollen of abdomen nearly uniform grayish-brown. Inner side of the front and hind tibiæ next the tips, and the under side of their first two tarsal joints, densely beset with rather short golden-yellow pile. Halteres pale brown. Wings hyaline, small cross-vein at middle of the discal cell, base of third submarginal cell at last third to sixth of distance between small cross-vein and apex of discal cell; costa not enlarged. Hypopygium shining black, but slightly wider near the apex than at the base, equal in length to the fifth and sixth abdominal segments united, its pile white, more dense below at the base.

♀ same as the ♂, except the genitalia; ovipositor slightly longer than the fifth, sixth and seventh abdominal segments taken together.

Length, 20 to 24 mm. Los Angeles and San Diego Counties, Cal. Two males and two females.

Efferia rava, n. sp.—♀. Same as *pernicis*, with these exceptions: Bristles of front, of upper part of occiput, on under side of antennæ, in lower part of mystax, and those of the palpi, black. Thorax with a median crest of rather long and nearly black hairs; the fan-like row of hairs in front of the halteres mostly black, pile of scutellum also black. Ovipositor but slightly longer than the sixth and seventh abdominal segments. Wings yellowish-hyaline.

Texas. A single female (Morrison).

Efferia candida, n. sp., ♂. Black, bases of tibiæ red. Pile and bristles of entire head white, a few bristles of the occiput sometimes black, pollen of head silvery-white. Pile of thorax short, sparse, black, not forming a crest, that behind and on the prothorax longer and mostly white; stripes and spots of thorax distinct, black. Pile of pleura, legs, scutellum and abdomen white, that on the abdomen rather long, parted in the middle and directed outwardly; abdomen nearly uniformly silvery-white pollinose, destitute of black spots; hypopygium shining black, but slightly wider near the apex than at base, slightly longer than the fifth and sixth abdominal segments taken together, its pile white. Front and hind tibiæ within next the tips, and under sides of their first two tarsal

joints densely short golden-yellow pilose. Wings hyaline, small cross-vein at middle of discal cell, base of third submarginal cell at last fifth of distance between small cross-vein and apex of discal cell; costa not enlarged. On the anterior part of the second abdominal segment are many rather large, transversely-elliptical punctures, and similar punctures also occur on some of the other segments. Antennæ similar in structure to those of *pernicis*.

♀ same as the ♂, except that the pollen of the abdomen is darker, and the pile is shorter and sparser; ovipositor as long as the fifth, sixth and seventh abdominal segments taken together.

Length, 20 to 25 mm. Los Angeles County, Cal. Six males and four females.

NOTES ON COLLECTING SOME OF THE SMALLER SESIIDÆ IN THE LONDON (ENGLAND) DISTRICT.

The one most commonly met with is *S. tipuliformis*, and is to be found sunning itself on the leaves of the currant bushes at the time when the fruit is about two-thirds grown, and on a bright sunny morning about 10 o'clock, or afternoon about 4 o'clock, one can easily take from six to twelve in one or two hours. Once I found them assembling, and took some thirty or forty in a very short time. It is a little difficult to procure the larvæ, as they feed in the two-year-old wood, and, as this is the fruit-producing part, it is better not to cut it while the owner is about, and when you can cut, I have found so many blanks that the bushes have suffered more than the gain warranted.

The next species commonly met with is our red-banded one, *S. myopæformis*, feeding in the bark of apple trees (about six feet from the ground), and can generally be found in gardens where *Tipuliformis* is found. I have never seen this moth at rest, and though one can generally count on taking several in a morning, one must watch the trunks of the trees and find them flying round and round, evidently for depositing eggs; cutting out the larvæ without doing much damage to the tree is hard, as they feed just under the bark.

Our next commonest one is *S. culiciformis*. For this we must go to the woods where birch is common; so, taking the train down to Croydon, ten miles (about the end of April), a two-mile walk brings us to West Wickham Wood, one of our best in the South London district. We go through it till we find a part which was cut down two winters back;

here, having found some nice looking birch stumps with frass showing, we set to work with a saw to saw off the sides, and so find we have secured one or two larvæ or pupæ, and in a good afternoon's work may perhaps obtain twenty. These we take home and put on wet moss to prevent drying up, and with care may in about six weeks breed a good many. I have found putting them under a bell glass a good way. I have never taken this insect on the wing.

The next, *S. formicaeformis*, with its pretty claret-coloured wings, we find flying in the sun along the sides of the roads which intersect our osier beds in the Mitcham district (about eight miles out). This species seems on the wing all the day, and fifteen or twenty is a fair catch. The larvæ can be cut out of the osiers about April, but it is very risky, as the basket makers have a decided objection to their osiers being cut.

S. chrysidiformis, the handsomest of all our smaller Sesiiadæ, with its bright scarlet wings, was, until some twelve years ago, most rare, fetching as much as two and three pounds per pair, but about that time they found out how to take the larvæ. Starting from the London Bridge station, on the S. E. R., we take tickets for Folkestone (town station). Arriving there after about two and a-half hours' run, we turn towards the Warren (a sort of undercliff running along the shore for about three miles), and after a mile's walk we get on to the slopes closest to the sea. Having brought a good, sharp, two-inch chisel with us, we look round for roots of dock and sorrel; the former we find are very scarce, having been cleared off by collectors; the latter, however, are still common, and having selected a good strong one dig it up, and scraping part of the root away see signs of workings. We put the root into a small sack we have provided and then search for more. In the course of a day we get a nice lot together, and upon our arrival home plant them into boxes. As it is only April, and the imago will not be out till June, there is now nothing else to do but to keep them watered and cover over with muslin till about the end of May. One year, from three days' work in Folkestone Warren, I bred about 150 fine imagos.

S. cynipiformis, feeding in oak, is said to occur in Hyde Park, but I have never been able to find it there. However, I have obtained the larvæ commonly at Tilgate in early May by finding the trunks of large oaks which have been cut down two winters previous, then ripping off the bark the larvæ are found feeding in it. In England the trees are cut off only four or five inches from the ground, and the moths seem to prefer

these to the growing tree. There, however, appears plenty of sap to support the larvæ till full grown. The only trouble, having got the larvæ, is to prevent drying up till time of emergence.

S. ichneumoniformis. I have never bred and have only taken it very sparingly by sweeping the herbage along the edge of cliff at Eastbourne and Ramsgate. The most I ever took in a day was five.

S. sphegiformis (one of our rarest ones, which is taken every year), has to be cut out of the alder. About March we take train for Three-Bridges Station, thirty miles out on the Brighton line. Arriving there we are soon on the ground and examining the alder stems from one to four inches thick. When we find workings which would denote larvæ in the second year, we saw off just below and then again about eighteen inches higher, and if very lucky we may get from ten to thirty sticks in a day. These have to be kept on moist moss in tin boxes till the middle of June, when the moth appears. Having a nice ♀ quite fresh, we are off by the first train, and having put her in a collar box with muslin on each side, we hang it to a bough and sit down and wait events. Perhaps nothing for the first half hour, but what is that buzzing in front of the box? We get up quickly and see it is a fine ♂. We need no net; he is so intent that we hold our bottle just behind him and bottle him on the wing. By this means I took twenty-three in one day. The curious part is, I never saw them coming until they were quite at the box hovering, and also that an insect so quick on the wing should not fly off, even when the bottle is as it were all round it and only the cork to put on.

S. scoliaeformis was taken out of birch fairly commonly at Llangollen, Wales, some twenty years back, but was quite worked out then, and for some fifteen years no one had taken it. However, last year in Scotland I hear it has been taken fairly commonly.

S. philantiformis was added to our list only some ten years back. It was found by accident feeding in the common thrift on the sea coast in the west of England, but I have never taken it.

S. vespiformis and *S. andreniformis*, the two remaining of our smaller Sesiidæ, are of the greatest rarity, and have only been taken singly.

Regarding *Tipuliformis*, in 1874 and 1875 I took and saw several in Mr. B. Gibb's garden, St. Catharine street, Montreal, among the currant bushes, and I should think it would be found in any of our old town gardens now.

LACHLAN GIBB.

A SUGGESTION AS TO THE IDENTITY OF CYCNIA DUBIA, WALKER.

BY HARRISON G. DYAR, ROXBURY, MASS.

In Vol. XXII., p. 120, of CAN. ENT., Prof. Smith calls attention to the fact that the above name awaits identification, and says: "There should be no difficulty in identifying this species, should it turn up." The moth was described by Walker as Cycnia, referred by Grote and Robinson to Phragmatobia, and lastly by Kirby to Estigmene (= Leucarctia). It has occurred to me that this form has already been turned up, and by Mr. Bruce, as described in Entom. Amer., Vol. III., p. 140, where it was shown to be a form of *Spilosoma virginica*. Compare the following descriptions:—

1. By Walker. "Female. Pale brown. Antennæ and legs with whitish tomentum. Thorax fawn colour, whitish behind. Abdomen somewhat ferruginous, with three stripes of black spots. Wings with two oblique, incomplete, indistinct, brown bands, composed of blackish spots. Forewings with whitish veins. Length of body, 5 lines; of wings, 16 lines. Hudson's Bay."

2. By G. & R. "Wings semi-translucent, brown or mouse colour; veins on both wings whitish above; eyes margined narrowly with white; legs shaded with whitish outwardly; abdomen with three rows of brown spots."

3. By Bruce. "Head, body and legs sooty brown, small black dorsal spots on body; all the wings brownish mouse colour. The veins on forewings distinctly white."

Mr. Bruce adds:—"If my friend had not preserved the eggs, and I had not reared the larvæ, this would certainly have been named as a new species, and would have been a standing puzzle to entomologists." If my surmise be correct, this has taken place.

C. dubia may be provisionally referred as follows:—

SPILOSOMA VIRGINICA, Fabr.

var. DUBIA, Walk.

1856—Walk., C. B. Mus., III., 682, *Cycnia*.
1868—G. & R., Tr. Am. Ent., Sc., II., 72, *Phragmatobia*.
1887—Bruce, Ent. Amer., III., 140, *Spilosoma*.
1890—Smith, CAN. ENT., XXII., 120, *Phragmatobia*.
1892—Kirby, Cat. Lep. Het., I., 227, *Estigmene*.

A NEW LAC-INSECT FROM JAMAICA.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

The lac-producing Coccidæ are usually referred to the genus *Carteria*, Signoret, but as this name is pre-occupied in Protozoa, Signoret (Bull. Soc. Ent. Fr., 1886) substituted for it the term *Tachardia*. The known species referable to this genus are five, namely :—

1. *Tachardia lacca* (Kerr.) India, on 43 species of plants of 18 natural orders (Watt, Dict. Econ. Prod. India, II., 1889, p. 409-412); British Guiana, on *Erythroxylon (Timehri*, Dec. 1890, p. 308).

2. *Tachardia larreæ* (Comst.), Arizona, on *Larrea*. (Rep. U. S. Dept. Agr., 1882).

3. *Tachardia mexicana* (Comst.), Tampico, Mexico, on *Mimosa*. (Rep. U. S. Dept. Agr., 1882).

4. *Tachardia melaleucæ* (Maskell), Australia, on *Melaleuca*, &c. (Tr. N. Z. Inst., 1891).

5. *Tachardia acaciæ* (Maskell), Australia, on *Acacia*. (Tr. N. Z. Inst., 1891).

To these may now be added a sixth, as follows :—

6. *Tachardia gemmifera*, n. sp., Kingston, Jamaica, on *Chrysobalanus icaco*, Linn.

Some months ago, Mr. H. Vendryes directed my attention to a Coccid which was damaging a Coco Plum in his garden, and kindly gave me some twigs with many scales upon them. These were evidently referable to a new *Tachardia*, which I call *gemmifera*, on account of the ruby-like prominence on the dorsum of the scale. The female scales (if the covering of lac can properly be so called) are subglobular, shiny, crimson-black, with a crimson ruby-like prominence on the centre of the back, best seen in somewhat immature examples. There are also one or two dorso-lateral prominences, more or less obscure. Sides with 4 or 5 keel-like folds. There is a conspicuous subdorsal aperture.

Length of scale, 5 mill.; diam., 5 mill.; alt., about 4 mill.

The scales are extremely hard, but will fracture if sufficiently pressed; sides of scale crimson by transmitted light.

The lac when heated melts to a substance about the colour of guava jelly, which turns crimson on the application of caustic soda: this colour-change is most marked.

The *female* is very broad oval, almost circular, posteriorly bluntly angled. On breaking open a scale, it is seen not to be completely filled

by the body of the female. In the cavity, besides the ♀, is a quantity of white secretion, breaking into short strap-shaped fragments. None of this appears externally. There are also more hair-like white fragments, some of which may be seen protruding from the produced tubular organs. This white secretion is no doubt analogous to the ovisac, as in it I found larvæ.

The *male scale* is cylindrical, rather over 1 mill. long, dull dark crimson. There is an anterior dorsal ridge, leading to a mid-dorsal swelling. Hind end truncate. Front end with a largle hole, where the ♂ has escaped; or, when the ♂ has not escaped, this is covered by a flat lid or cap.

The *larvæ*, as observed in numbers on the bark of the twig, are crimson, elongate, with the segmentation distinct; sides with a longitudinal furrow. Caudal hairs about ⅔ length of body, free from secretion. These hairs arise some distance apart, and immediately caudad of each is a small elongated process or tubercle; between these, and terminating the body, is a short, white, opaque caudal stylus, which is distinctly bifid, and no doubt consists of the anal hairs covered by secretion. This arrangement is suggestive of *Dactylopius*.

The last joint of each antenna bears two long hairs, longer than the whole antenna; this is also the case with the larva of Maskell's *Carteria melaleucæ*.

The claws have short knobbed digitules; and the tarsus presents the usual pair of knobbed hairs, which are very long. The tibia seems quite as long as the femur, and the tarsus is *very* little shorter than the tibia. There are some short stiff hairs about the base of the legs.

Maskell remarks (Indian Mus. Notes, Vol. II., No. 1, p. 62), on the almost invariable rule that in larval Coccidæ the tarsus is longer than the tibia. This, however, is not the case in *Erischiton cajani*, Mask.; and a further exception is presented by *Tachardia*, in which, at least in *T. gemmifera* and *T. melaleucæ*, the tibia of the larva is slightly longer than the tarsus.

On placing some of the ♀ scales in soda, I found fragments of a Chalcidid parasite, which seems to belong to the genus *Aphycus*. The antennæ present the following characters: Scape long, with an apparent false joint near its base, its upper part zoned with brown; pedicel about twice as long as broad; the following 6 joints moniliform, increasing regularly in size, the first three joined together, the last three more separated and bearing whorls of hairs. Club large, brown (the joint just

before it is colourless), and consisting of three joints. The middle tibia has two brown zones, and a large thick spur. The ovipositor projects but slightly beyond the abdomen, and bears on each side of its tip a small brush of hairs.

Tachardia gemmifera must, I think, be regarded as an injurious insect, since it affects the Coco Plum rather seriously. The lac is so small in quantity that it would probably not pay to collect and prepare it.

Institute of Jamaica, Kingston,
Jamaica, Dec. 27, 1892.

NOTES ON TAXONUS NIGRISOMA AND T. DUBITATUS.

BY J. G. JACK, JAMAICA PLAIN, MASS.

The following notes of observations of some stages of these two little saw-flies are fragmentary and incomplete, but they are now given as they may be of some assistance to others working upon this group of insects.

Taxonus nigrisoma, Nort., Larva.—The fully grown larva is cylindrical, and 10 to 12 millimeters long. It is of a pale green colour above, very slightly darker towards the sides above the spiracles, the spiracle line being marked by very minute dark dots one to each segment; and the under side (including the abdominal or prop legs) is of a dull whitish colour.

The upper part of the head is dark brown, shading from pale brown to whitish on the face and whitish beneath.

The eyes are black and prominent; antennæ small, six-jointed and light brownish coloured; and the mouth parts dark.

The thoracic legs are of a dull white colour, generally bearing more or less easily distinguishable narrow smoky brown or dark markings on the outer side of the apical segments, the strong, simple, terminal claws usually having a dark brown or black tip.

When they ceased feeding at full growth the larvæ abandoned the leaves of their food plant, which was *Polygonum Muhlenbergii*, Watson, and prepared for pupating by boring into the green stems of the food plant or sometimes into some such substance as partially decayed wood if it happened to be in the vicinity. In these burrows pupation takes place without the formation of any cocoon. The pupa is uniformly yellowish white in colour, the dark eyes showing prominently.

Within a week or two after entering their burrows the insects emerge as saw-flies. Both larvæ and pupæ were very much parasitized by

Pimpla pterelas, Say, of which species I have bred both the males and females, the latter being by far the most abundant.

Apparently, the male imago of *Taxonus nigrisoma* has not been described, but it does not differ from the female in general appearance, except by its much smaller size.

Collected and observed in the Arnold Arboretum, at Jamaica Plain, Mass., in June, 1890: the saw-flies noted as emerging from the stems of the Polygonum about June 30 and some days later. For the determination of the food plant I am indebted to Prof. William Trelease.

Taxonus dubitatus, Nort. The larvæ of this species are of a light grass-green colour, so that it is not an easy matter to detect them when resting on the fronds of the Sensitive Fern (*Onoclea sensibilis*) upon which they feed. I have bred the saw-flies from the larvæ, but made no critical notes as to peculiar markings, if any exist. There are certainly no spots or markings large enough to be noticeable by a casual look, the whole effect being green.

The saw-flies of this species appear as early as the latter part of May and the beginning of June, and are also very abundant about the fern early in July, so that there must be at least two, and possibly more, broods. The males were seen in greatest abundance.

When at rest both males and females fold their legs and antennæ, and drop to the ground on very slight alarm.

Collected and observed at Jamaica Plain, Mass., in 1890.

NOTE ON COPIMAMESTRA AND EULEPIDOTIS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In discovering a North American representative of the European *Brassicæ*, I proposed for this latter and our *Occidentis* the generic title *Copimamestra*, based on the tibial claw. In the Philadelphia List the term *Barathra* is resuscitated out of Hübner's Verzeichniss, p. 218, for the genus, but incorrectly. Hübner refers two species, *Brassicæ* and *Albicolor*, to his genus, and I was free to use for one of them the new term. I need not state that Hübner took no note of the structure of *Brassicæ*, and that *Albicolor* differs structurally. I must therefore insist that *Copimamestra* be used for the two species *Brassicæ* and *Occidentis* under the laws of scientific nomenclature.

In the CANADIAN ENTOMOLOGIST, when discussing Hübner's figures of North American Noctuidæ in the Zutraege, I drew attention to his

illustration of *Eulepidotis alabastraria*, figs. 311, 312, which he states to be from Savannah, Georgia, l. c. 22. It is probable that the locality is incorrect, and that this species is not found in North America. I have identified it in the Bremen Museum from South America. The insect is not a Geometrid, but belongs to Guenée's genus *Palindia*, and is described in the Spec. Gen., VI., 275, from Brazil. It seems, therefore, likely that Hübner's locality is incorrect, while Guenée makes no note upon the subject.

DESCRIPTIONS OF CERTAIN LEPIDOPTEROUS LARVÆ.

BY HARRISON G. DYAR.

(Continued from page 160.)

Ichthyura vau Fitch.

Egg.—The colour of the unhatched eggs is deep purplish-pink, pale around the bottom; slightly shining.

First stage.—Head bilobed, bearing a few hairs; shining black; width .45 mm. Dorsum broadly bluish-white, except the black cervical shield and anal plate and joints 5 and 12, which latter are hardly enlarged, coloured vinous-brown. Whole lateral area also brown but paler, and broken into patches. Feet black outwardly. Hair fine, very long laterally, pale, darker dorsally, arising singly from black conical tubercles with the normal arrangement. The body is minutely dotted with brown (under a half-inch objective) and there are no hairs present except those from the tubercles. The hairs are simple, not glandular nor branched. The cervical shield is elongated transversely, with a central constriction.

Second stage.—Head bilobed, median suture deep at vertex but shallow in front; head flattened before, slightly wider than high. Colour, shining black, with some hairs; width 7 mm. Body flattened, wider than high, the dorsal region pale yellow, with the tubercles of rows 1 and 2 darker yellow and three narrow brown lines. The enlarged dorsal portion of joints 5 and 12 and the whole lateral area is deep vinous-brown. Cervical shield and anal plate blackish, but not so distinct and corneous as before. From the tubercles arise singly long hairs, and many others arise from little elevations on the body; but these are much shorter.

[We regret that the above note, completing the description, did not reach us in time for insertion in its proper place in the June number.—Ed. C. E.]

CORRESPONDENCE.

HEPIALUS 4-GUTTATUS.

Sir: The statement on page 125 of CAN. ENT. for May, that *4-guttatus* is a synonym of the typical *argenteomaculatus*, is incorrect. The type form of the latter is the smaller not pinkish form, and is the *argenteomaculata* of the Reports on Ins. Inj. to Vegetation. The form *4-guttatus* is apparently that figured in "Lake Superior" by Agassiz. So far as I am able to judge from the short description, in which the colour seems to coincide with *4-guttatus*, the writers have apparently redescribed my *4-guttatus*.

A. R. GROTE.

ARGYNNIS ASTARTE.

Sir: It may interest your readers to know that *Argynnis astarte* (= *Victoria*, W. H. Edw., CAN. ENT., XXIII., 198, *fide* Strecker, Ent. News, Nov., 1892, p. 218) Double-Hew., which was rediscovered last year by Mr. Bean in the Rocky Mountains near Laggan, is, as far as I can judge from the single specimen he has been good enough to send me, a very near ally, and perhaps not separable from *A. amphilochus* of Menetries, a species which appears to be either very rare or very local near the head waters of the Amur river in Siberia. My specimen is smaller and paler than *Amphilochus*, but every marking seems to be identical in position. It is quite probable that when the northern extension of the Rocky Mountains has been explored, this species will be found at lower elevations, as I learn from Mr. Bean that he took it at 8,500 feet.

W. J. ELWES, Colesborne, Andoversford, Gloucestershire, England.

P. S.—I may add that I have still spare copies of my revisions of the genera *Argynnis* and *Erebia*, which I shall be glad to send to anyone who wants them in Canada or the States.

LITHOPHANE ORIUNDA.

Sir,—On the 24th of Sept., 1892, I found, in the vicinity of London, a moth new to me. It was resting in an upright position, on the stalk of a weed, quite fresh, as if it had but recently emerged. Its thoracic crest and tufts stood out conspicuously, which, with its gracefully curved and pointed wings, at once suggested a *Lithophane;* but its colour and markings were so different from what I had been accustomed to in that genus, that I hesitated to decide upon it as such.

In November I sent it with other material to Prof. J. B. Smith for

identification. He pronounced it to be a *Xylina* without doubt, but retained it for further investigation. On the 6th of March, 1893, I received a letter from him conveying what was to me the gratifying information that it had proved to be *X. oriunda*, on comparison with a typical specimen in the U. S. National Museum. I had long desired to obtain a specimen of *Oriunda*, and made inquiries for it of those with whom I exchanged, but none of my correspondents had ever met with it. *Lithophanes* have been one of my favourites, and my interest in this one was specially awakened by reading in the CANADIAN ENTOMOLOGIST, Vol. 7, p. 188, a quotation made by Mr. Grote from a letter received by him from Mr. Norman, where, after giving the names of the Lithophanes he had taken at Orillia, he adds, "and that lovely *Oriunda* a single specimen," that quotation constituting the whole of my knowledge of the insect until recently.

The original description by Mr. Grote is to be found in the Bulletin of the Buffalo Society of Natural Sciences, Vol. 2, p. 160, which I copy in full for the benefit of those of your readers who may not have the volume to refer to :—

"LITHOPHANE ORIUNDA, Grote. Allied to *L. Bethunei*, and belonging to the typical group of the genus. Distinct, intense, even, somewhat purply-brown. Forewings concolorous, with the costal edge shaded with whitish to the t p. line, and interrupted by oblique brown streaks indicating the transverse lines. Reniform and orbicular spots more or less shaded with whitish, shaped as in *L. Bethunei*. Claviform distinctly outlined in black, large. Subterminal line alone distinctly indicated by pale points. The median dentate lines more or less lost in the ground colour. Veins terminally indistinctly black marked opposite pale dots on the brown dentate fringes. Secondaries dark fuscous, with a warmer shade on the fringes. Beneath paler, shaded with reddish, with a distinct discal spot on the paler hind-wings and a common line. On the primaries the pale costal dots are evident on both surfaces. Expanse, 34 m.m. Canada, Mr. Wm. Saunders, No. 960.

"Colour like *L ferrealis*, but darker, with the subterminal line more even, the orbicular smaller, and the costal discoloration paler and more distinctly contrasted and limited."

This description is dated Sept., 1874.

No mention is made of the number of specimens the description is taken from, and Prof. Saunders does not now recollect the number of specimens captured by him, but knows that they were but few; perhaps not more than three. It would be very interesting if the number of speci-

mens to be found in collections could be known. So far as my information goes, it still remains an exclusively Canadian species.

J. ALSTON MOFFAT.

UNIDENTIFIED BOMBYCIDS.

Sir: Concerning Prof. Smith's note on page 164 of June CAN. ENT., it is, perhaps, unprofitable to enter into a discussion as to whether the generic names from Hübner's Tentamen should be adopted or not; but, as far as our Bombyces are concerned, there are only four of these names with which we have to do. They are: (1) *Nycteola*, Hubn., for *Sarrothripus*, Curt.; (2) *Hypercompa*, Hubn., for *Zoote*, Hubn. (Verz.), for *Euprepia caja*, Linn.; (3) *Dasychira*, Hubn., for *Dasychira*, Steph.; (4) *Melalopha*, Hubn., for *Ichthyura*, Hubn., (Verz.). The third of these introduces only a change in the name of the author; *Euprepia* cannot stand for *caja* anyway, since it must be used for the species of "Arctia" according to Mr. Kirby's method of fixing types, which seems eminently proper. The name *Arctia*, Schrank, has for its type *A. villica*, Linn., replacing *Epicallia*, Hubn. Our species, *E. virginalis*, by the way, is not congeneric with *A. villica*, nor with *C. dominula*, as Kirby puts it; but it seems hazardous to change it till the European genera have been revised. If we discard *Hypercompa* (Hubn., Tent.), for *caja*, the name *Zoote* (Hubn., Verz.), comes next in order. Thus there are only two of the Tentamen names which supplant names now in use, and only one which supplants a name by a different author. It seems to us more satisfactory to adopt these names and end controversy about them, especially as they have been adopted by Kirby in his work where the Bombyces of the world are brought together in a uniform system. We dislike to depart from this standard without conclusive reason.

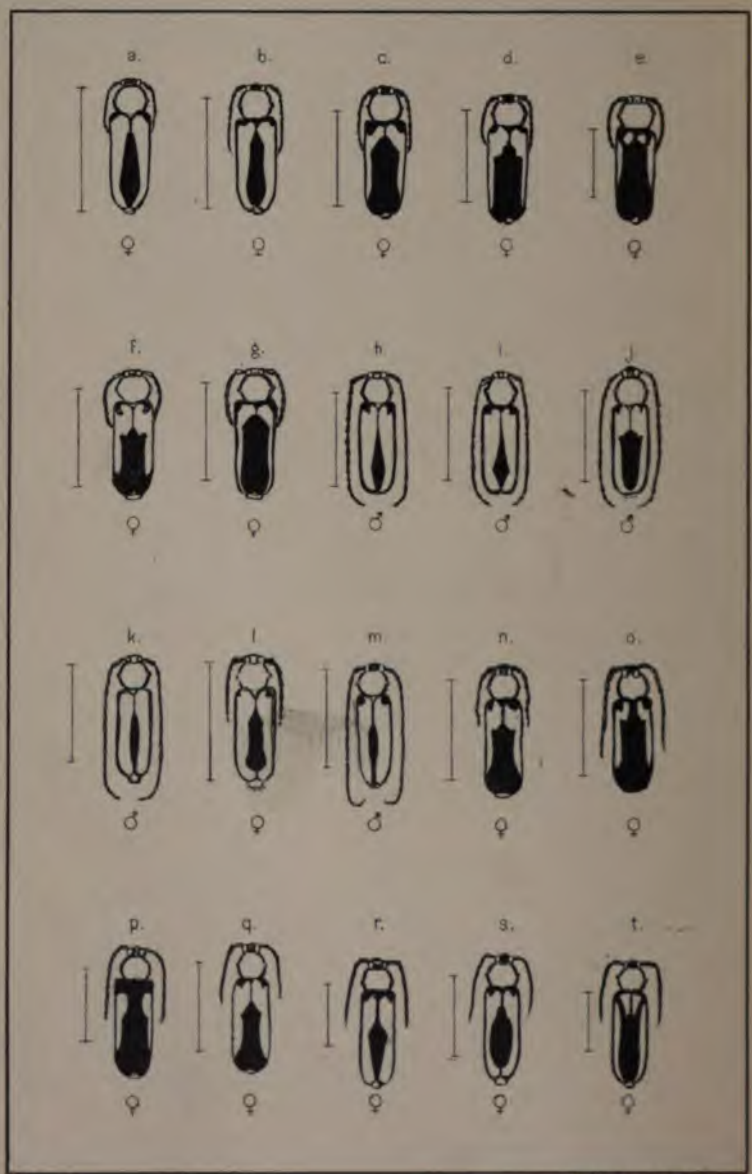
HARRISON G. DYAR.

AGASSIZ ASSOCIATION.

Sir,—The Henry Edwards Entomological Corresponding Chapter of the Agassiz Association invites entomological students who read this notice to join its ranks. Members are expected to keep each other informed of the progress of their work in special lines of study, and to contribute to the published reports. During the winter one or more courses in Elementary Entomology will be conducted. The initiation fee is 50 cents. For further particulars, address the Secretary,

WILLIAM L. W. FIELD, Guilford, Conn.,
(After Oct. 1, Milton, Mass.)

Mailed July 7th.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The Canadian Entomologist.

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SOME INTERESTING COLOUR-VARIETIES IN THE GENUS CROSSIDIUS.

BY H. F. WICKHAM, IOWA CITY, IOWA.

While engaged in the re-arrangement of some boxes of Cerambycidæ recently, the peculiar modifications of the ordinarily very simple pattern of coloration in the genus *Crossidius* brought about the desire to see to what extent and under what circumstances certain of these modifications were carried on or existent. The results of the studies ensuing thereupon are presented in the present paper.

The pattern which may be regarded as the typical one, and upon which all the others are built, either by simple addition or subtraction, is as follows :—Head black, thorax black with yellow side margins, elytra yellow with the humeri and a large elongate common sutural spot black. I do not wish it understood, however, that this is to be regarded as the original pattern from which the others have been evolved through the processes of natural or sexual selection—only as a common plan of coloration, and one which forms a convenient standard of comparison.

In habit the beetles are diurnal, frequenting flowers of golden-rod and other yellow-flowered Compositæ, more especially in the arid regions of the United States and southward. In our faunal limits the genus is found from Montana and Oregon to Texas and Southern California, spreading over a vast extent of territory, and one of great differences in climatic and atmospheric, as well as of geologic characters. Under these circumstances we might well expect to find the genus composed of either many more or less closely allied species, or one or few very variable ones. My own experience goes to show that, in this group, those species of wide distribution offer many interesting variations, and to bring some of these before the reader I have prepared the accompanying plate, wherein the body and antennæ of the insects are represented in a conventional manner, and all accuracy of delineation confined to the points under discussion—the elytral pattern.

That the yellow ground colour of most of the species is of protective value, and that the black markings aid in this object by breaking the continuity of outline, I think no one will contradict who has seen these insects in their natural homes, whether he be a believer in any of the theories advanced to account for this phenomenon or not. That the variation within specific limits is also very great will not be denied by one who has seen cabinet series from various parts of the country; but the meaning of this variation and its co-relations, if such there be, with the multitudinous incidents of food, size, habitat, altitude, temperature and moisture, are not to be made out at a sitting, but will take years of thought and labour to demonstrate. The few facts, for the bringing forward of which the present paper was written, may none the less serve a useful purpose in aiding those whose investigations are of a parallel nature to keep a sort of check on their own investigations, or to find that the work of others may help to bear out the conclusions arrived at in their own.

The figures *a* to *j* of the accompanying plate represent some of the forms shown by *Crossidius pulchellus* from southern localities. It will be noticed that the lightest forms, *h* and *i*, are both males, while the darkest, *c*, *d* and *e*, are females; the male shown at *j* is, however, darker than the females shown at *a* and *b*, the pattern resembling more closely that of *g*, though the males with fusiform sutural blotch, *g* and *i*, are lighter than the correspondingly marked females *a* and *b*; this is true also of the male with shield-shaped spot, *f*, and its corresponding females, *a*, *d*, *e*, *f* and *g*. The females are smaller than males. [illegible] an increase in comparative size of the dark spot with decrease in actual size of the insect, as will be seen by comparing [illegible] indicating the length of each specimen figured. [illegible] that the female tends to the production of [illegible] over those of the male, and that the smaller specimens of both sexes are darker than the larger.

[illegible] *f* are of the species which have been referred to *C. [illegible]*, but which I am [illegible] to consider simply a small form of *C. [illegible]*, [illegible] with the description of the former species. [illegible] will, I think, bear out well the conclusion [illegible] from the preceding series that the small [illegible] are darker than the larger ones. At *f* is [illegible] the humeral spot is proportionately [illegible] and the sutural mark at what is, in most [illegible] the base of the elytra. This may be compared with figs. *a*

where a somewhat similar conjunction is brought about, not so much by the prolongation of the humeral spot as by the extension forward of the sutural patch.

Figure *k* represents a form of coloration sometimes seen in the male of *C. longipennis*, Casey, of which species a series of fifty specimens, all from Albuquerque, New Mexico, lies before me. Of these only two of the males are so heavily marked with black as the figure, while all but two of the females are darker, the majority tending towards *a* (but lacking the humeral spot), while one is almost as dark as *q*. In this species, as in *pulchellus*, the females are the more heavily marked with black, but the size of my specimens is so constant that no correlation can be traced between size and colour. It may be worthy of remark, however, that the specific pattern of coloration involves much less black than that of *C. pulchellus*, while the actual size of the insect averages much greater—an indication of a tendency in large species in this genus to become light-coloured as well as large individuals of some of the species.

At *l* is shown a specimen of *C. intermedius*, which will illustrate the pattern of coloration of the only specimen I possess. It differs from most of its congeners in having pale legs and antennæ, and inhabits the drier portions of the southern plains in the same localities, and with the same habits, as *C. pulchellus*, though the range is probably much less extended.

C. nitidicollis, Casey, is represented by figures *m* and *n*, and is found in the neighborhood of Tucson, Arizona, and on the foothills of the mountains near by. It will be noticed that the male shows very little black, while the female is quite dark, almost exactly resembling fig. *f* of *C. pulchellus*. Here we find the female, as usual, darker than the male.

In the figures *o* and *p*, which show the markings of *C. discoideus*, a red and black species, is noticed an extension anteriorly of the sutural mark, which here reaches the base of the wing covers, with, in one case, a corresponding increase of the humeral spots which have been spread over the whole base of the elytra, and become confluent with the sutural blotch. Both specimens are females, so no sexual comparisons can be made, though the small specimen is the darker. My specimens are from the high mountains of Colorado (Cockerell) and from Williams, Arizona, the latter place at an altitude of between 6,000 and 7,000 feet.

The results of some researches regarding melanism in insects have lately been published by Mr. J. W. Tutt, of London, England. He believes that moisture is the chief excitant cause of melanism, and has

offered proof to show that among the British lepidoptera the darkest forms are commonest in the more humid parts of England. Given an excitant cause, he shows that as moisture in the atmosphere tends to darken the soil, trees and other natural objects, natural selection would, if not interfered with by opposing forces, tend to perpetuate the melanic forms. This line of thought has suggested to me the desirability of making some inquiries regarding the climatic conditions of the different regions from which my own specimens come. A request for figures stating average annual precipitation has at once been acceded to by Prof. Mark. W. Harrington, Chief of the U. S. Weather Bureau, who has kindly sent me the appended statistics:—

Annual precipitation at	Albuquerque, New Mex.,	7.19 in.	May to Oct ,	5.42 in.
"	"	Helena, Montana,	13.22 in.	"	" 7.90 in.
"	"	Flagstaff, Arizona,	25.95 in.	"	" 9.12 in.
"	"	Prescott, Arizona,	17.06 in.	"	" 8.50 in.

In most of these cases the observations have extended over a number of years, but the record for Flagstaff, Ariz, has been kept for only seventeen months, and Prof. Harrington writes me that it may be too high an average. My object in getting the figures for the months of May to October (inclusive) is this: If the action of moisture on the colours of insects be purely physiological, it would act chiefly, no doubt, while the insect was growing,—that is, through the active part of the larval stage, extending through the warmer months of the year; if, on the other hand, it acts indirectly by bringing the tints of the insect, through the work of natural selection, more closely in harmony with the darker colours with which this wet weather would surround it, it must nevertheless act during these same months.

While my paper does not deal exclusively with any one species, the treatment of the species [illegible] and on this ground it may prove profitable to include a few comparisons.

[illegible] from the driest of these points—Albuquerque, New Mexico—[illegible] two males, none of which have [illegible] very [illegible] along the suture, and eighteen [illegible] as dark as [illegible] and only one [illegible] Southern California, [illegible] I found *C. faggi* [illegible] Nanaimo, we [illegible] had a very solid head of

bloom, without the reliefs of light and shade thrown by the more open inflorescense of the yellow-flowered plants on which my other species were chiefly taken. Dr. Leconte records *C. testaceus* from *Baccharis* without specifying more definitely.

Six specimens of *C. pulchellus* from Williams, Ariz., are of a rather dark form, such as shown by *g* and *d*, with the exception of two males which are somewhat lighter, as *h*, and one darker female, like *e* Four males from Peach Springs and Seligman are a very little lighter than *h*, while two females from the same localities are darker than the males, but not quite as dark as the Williams female. Three examples from Albuquerque are about the same as the Peach Springs specimens. A series of nineteen specimens from Helena Mon., averaging much smaller than those of other localities, are of a type very nearly the same as the Williams specimens, so far as regards the extent of black markings.

Summing up the evidence, then, we find:

1. Light specimens *(C. longipennis)* at Albuquerque, where the precipitation is 7.19 inches.

2. Darker ones *(C. pulchellus)* at Peach Springs and Seligman, where it is about 17. inches.

3. Still darker ones at Williams, where it is about 25.95 inches.

4. Specimens about the same as these last from Helena, Montana, where it is about 13.22 inches.

Now we have to reconcile with it, if we are to accept Mr. Tutt's theory at all, the phenomenon of specimens from Helena, with a precipitation of 13 22, presenting a phase of coloration as dark as those from Williams, with an annual precipitation of 25 95 inches. This, however, is not a great difficulty, since I have before mentioned the fact that the Helena beetles average much less in size than the more southern ones, and here I think it quite possible that we have the keynote to the whole thing. Mr. Tutt has already* adduced proof that some forms of disease produce melanism, and it has occurred to me that this species *(C. pulchellus)* having its metropolis in the south, where comparatively mild winters prevail, may find it a hard struggle to exist on the plains of Montana, where

* Melanism and Melanochroism, p 44 *et seq.*

the winters are of exceptional severity. The consequent weakening of the individuals by this undue exposure may produce a stunted and debilitated race, and the effects of this debility be shown in the lack of the bright yellow pigmentation so characteristic of the forms from the dry, warm regions of the South.

I am far from thinking that all has been written upon the subject of the variation in *Crossidius* that the occasion offers, but space has its limits and the material is too scanty to more than indicate in what direction we may look for the explanation of some of the phenomena presented. The data regarding precipitation in the different localities even cannot entirely be relied upon, as I have had to apply the average taken at Flagstaff to Williams, which is but few miles distant, and at very nearly the same elevation. In the same way it has been necessary to take that given at Prescott as approximately correct for Peach Springs and Seligman. However, I hope the article may attract the attention of more of our American students of entomology to a fascinating branch of the science, and that we may soon see in this country a number of workers who will follow out the lines of investigation suggested by our English brothers, and for the furtherance of which they have established a new magazine† especially devoted to the discussion of variation and its manifold causes. Most of my own work in this article has been suggested by the writings of Mr. Tutt, and to its works I would refer those who care to follow up the subject and both in a reasonable compass and without the mass of irrelevant matter which encumbers some of the recent works dealing with the speculative side of entomology, where new fields of investigation may be opened up to those who delight in the beauty of their insects as well as their forms.

NOTES ON TWO SPECIES OF TENTHREDINIDÆ, FROM YOSEMITE, CAL.

BY HARRISON G. DYAR, ROXBURY, MASS.

Schizocerus tristis, Cress.

var. FUMIPENNIS, *n. var.*

Eight examples bred from larvæ in the Yosemite Valley differ from Mr. Cresson's description in having both wings uniform smoky blackish, about as dark as the hind wings of *Hylotoma scapularis*, Klug. In the ♀, the pale parts of the legs are not white, but of an obscure sordid whitish, tinged with brown, and not contrasting with the black body parts; the abdomen is obscurely banded with brown between the segments.

Length of ♀, 6 mm.; ♂, 5 mm.; expanse of wings, ♀, 13.5 mm.; ♂, 11 mm.

Larva.—Head rounded, wider than high, the mouth parts pointed; clear green, shaded with black across the middle; ocelli black, mouth brownish; width, 1 mm. Thoracic feet large, the abdominal ones small, present on joints 5-10 and 13 (10 pairs in all). A slight subventral ridge; body transversely creased and covered with round, smooth, concolorous, wart-like elevations, uniform green, the dorsal vessel showing darker by transparency; a stigmatal row of black dots. The anal plate terminates in four short pointed projections tipped with black, and there are two others below the anus. Thoracic feet dusky. Length of larva, about 10 mm.

Cocoon.—Formed on the back of a leaf: oblong, rounded, symmetrical, composed of coarse yellowish silk of loose and irregular texture, not compact enough to be opaque.

Pupa.—Eyes prominent, cases free, the wing cases small; abdomen cylindrical, slightly tapering; colour clear green, the legs colourless, eyes black and two blackish shades on the thorax, as well as at bases of wing cases.

Food plant—*Hosackia grandiflora*, Benth.

LABIDA OPIMUS, Cress.

A ♀ example differs considerably from Mr. Cresson's description:—

var. BIGEMINA, *n. var.*

Head black; clypeus, labrum, mandibles (except at tip), palpi, lower half of cheeks, and elongate oval spot resting on the insertion of

each antenna and tip of basal joint of antenna outwardly, greenish yellow. Thorax black, the prothorax, tegulæ, two wedge-shaped bands along the parapsidal grooves, scutellum, centre of metathorax above, and a large angular spot on pleura, also yellow. Legs yellow, except the bases of coxæ, the tips of hind femora, tips of all the tibiæ outwardly and the tarsal joints, especially toward their tips, which are black. Wings smoky brownish-hyaline, irridescent, nervures black, the basal part of stigma and costa adjoining stigma yellowish. Abdomen greenish-yellow above and below, except the basal half of basal plates, a triangular spot on basal part of each dorsal abdominal segment, except the last, and ovipositor sheaths, which are black. Length, ♀, 11 mm.; expanse, 22 mm. The pair of spots between the eyes and second pair on the front part of mesothorax are conspicuous.

FITCH'S TYPES OF N. A. MEMBRACIDÆ.

BY F. W. GODING, M. D., PH. D., RUTLAND, ILLINOIS.

(Continued from page 172.)

No 3123 is *Ophiderma flava*, Godg.

No. 4416 is the type of *Thelia crataegi*, Fh.

No. 1875 is the type of *Ceresa carinicornis*, Fh. The brief description given by Fitch is correct, but not sufficiently complete. Good characters are present for separating it from its congeners.

The species labeled *Telea Kirbii* is *T. turrifrontata*, Fh., and that labeled *Smilia fatua* is *S. camelus*, Fabr. Fitch's manuscript name *Smilia* is what is now known as *Stictocephala*, Std. The descriptions of the species of Fitch's study, published in Emmons's N. Y. Report, were written by Dr. Fitch as stated by Emmons in a foot note, and there is no valid reason for ascribing such species to Emmons. Fitch described the species and presented the types which are now in the collection of the National Museum. Each preserved specimen should be attached to all such species which are described or referred to them. While Fitch depended largely on the distribution of the colors and shape of the crest of the prothorax, yet he gave some structural characters which are of use in identifying his species. The color of the last moult is very soft and easily modified. Drawings can be made from the eggs of a species which will show characters of great value in separating species. It should be used only with other and less variable characters.

SYNOPSIS OF THE DIPTEROUS GENUS THEREVA.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

The following table contains all the species of Thereva known to me as occurring in this country north of Mexico. *Thereva tergissa*, Say. (*corusca*, Weid.), and *T. crassicornis*, Will (*non Bellardi*), belong to Psilocephala. *Thereva nigra*, Say., is a true Thereva. *T. albiceps*, Loew., is evidently the same as *albifrons*, Say; and *gilvipes*, Loew., is the other sex of *flavicincta*, Loew., as that author suspected at the time of describing these two forms. Walker's and Macquart's species have not been identified, nor could this be done with any degree of certainty except by an examination of the type specimens.

The table is as follows :—

1.—Antennæ black 3
Antennæ yellow; California species 2

2.—Pile and bristles of head and thorax wholly whitish, knob of halteres yellow, front of female wholly opaque..*semitaria*, n. sp.
Pile and bristles of head and thorax largely black, knob of halteres black, front of female with a shining black spot .....*fucata*, Loew.

3.—Femora largely or wholly black 5
Femora yellow, knob of halteres black, front of female with one or two shining black spots 4

4.—Front of female with two shining black spots, front of male destitute of black pile ....*duplicis*, n. sp.
Front of female with only one shining black spot, front of male with many black pile .....*flavicincta*, Loew.

5.—Knob of halteres black 8
Knob of halteres yellow or white, front of female destitute of shining black spots 6

6.—Front of female with two large, velvet-black spots, apices of femora black 7
Front of female destitute of such spots, apices of femora broadly yellow, cross-veins of wings not bordered with brown. .....*candidata*, Loew.

7. Stigma dark brown, cross-veins bordered with brown ..*otiosa*, n. sp.
Stigma pale yellow, cross-veins not bordered ..... .*vialis*, O. S.

8.—Front of female partly shining black..... 9
Front in both sexes wholly opaque and covered with pollen.....11
9.—Abdomen of female opaque on the first six segments, front with two shining black spots..... .....*Johnsonii*, n. sp.
Abdomen of female largely shining.....10
10.—Front of female with a shining black spot reaching the lower ocellus; pollen on sides of front extending less than half way from each eye to lower ocellus.....*strigipes*, Loew.
Front of female having the lower half shining, the upper half covered with pollen.....*hirticeps*, Loew.
Front of female wholly shining black, except each lower corner .....*nigra*, Say.
Front of female with only one shining black spot; pollen on sides of front nearly or quite reaching the lower ocellus..*frontalis*, Say.
11.—Pile of front largely black..... 13
Pile of front wholly white, front of female destitute of large, velvet-black spots 12
12.—Bristles of occiput black, eighth abdominal segment in the female shining black, stigma dark brown..... .....*albifrons*, Say.
Bristles of occiput whitish, eighth segment in the female covered with pollen, stigma pale yellow..... .....*nevadia*, n. sp.
13.—Wing [illegible] not broadly bordered with brown...14
Wing [illegible] broadly bordered with darker brown..... .....*mata*, Loew.
14.—Third joint of [illegible] inverted pyriform, the first joint [illegible] .....*melanophthalma*, Loew
Third joint of [illegible] .....*melanoneura*, Loew.

[illegible] palpi, knob of the [illegible] abdominal segments, [illegible] of tarsi, yellow, the [illegible] whitish pollinose, the [illegible] yellowish white, [illegible] as broad, being [illegible] as the third joint. [illegible] costal margin [illegible] narrowly bordered with [illegible] and short petiolate.

♀ same as the ♂, except that the pollen on the upper part of the front is more yellow, and the eighth and ninth abdominal segments are shining yellow, posterior margins of the other segments also more or less yellow.

Length, 8 to 11 mm. Southern California. Eleven males and four females, in April and May.

Thereva duplicis, n. sp. ♀ black, the femora, tibiæ, tarsi, except at apex, and the hypopygium, yellow. Head gray pollinose, the pile wholly yellowish-white, that of the vertex, bristles in upper part of the occiput and on the antennæ, black; third antennal joint as long as the first and only slightly wider, style one-fourth as long as the third joint. Pile of thorax mixed black and yellowish-white, the bristles black; pile of pleura white, that on the scutellum more yellowish, the four bristles black. Pile of abdomen yellowish-white, that of the venter white, of the femora mixed black and white, of the tibiæ and tarsi black; bristles of legs also black. Wings grayish-hyaline, the veins largely brown and indistinctly bordered with brown, stigma dark brown, fourth posterior cell closed and short petiolate.

♀ same as the ♂, with these exceptions: Pile of front largely black, its pollen yellow; in middle of front are two transverse shining black spots separated from the eyes by a pollinose interval nearly equalling the length of the second antennal joint. Posterior margin of each abdominal segment, except the first, yellow, including the greater portion of the last three segments; base of the third, fourth, fifth and sixth segments, and the whole of the following ones, shining; pile of the fourth and following segments both dorsally and ventrally erect and black.

Length, 9 to 13 mm. South Dakota (Aldrich), Montana (Morrison). One male and two females.

Thereva otiosa, n. sp. ♂ black, the knob of the halteres, and posterior margins of the second and third abdominal segments, white, tibiæ, except at apex, and base of tarsi, yellow. Head white pollinose; that on upper part of front narrowly black, on the vertex grayish-black; pile of entire head, except the black pile of the vertex, white; bristles of upper part of occiput and on the antennæ black. Third joint of antennæ five-sixths as long as the first and slightly narrower, style one-fourth as long as the third joint. Thorax grayish-black pollinose and marked with two narrow whitish pollinose vittæ, the lateral margin also whitish pollinose; pile of thorax mixed black and white or yellowish, the bristles

black; pile of pleura and scutellum white, the four bristles of the latter black. Abdomen whitish pollinose, that at the base of the second, third and fourth segments blackish-gray; pile of abdomen, venter and femora white, a few on the hypopygium black; short pile of tibiæ and tarsi, like all the bristles of the legs, black. Wings, including the space between costa and auxiliary vein, grayish-hyaline, veins black, narrowly bordered with brown; stigma dark brown, fourth posterior cell narrowly open, or closed and short petiolate.

♀ same as the ♂, with these exceptions: Front dark-brown pollinose on the upper part, and near the middle marked with two large rounded velvet-black spots contiguous to the eyes; eighth and ninth abdominal segments shining, their pile largely black.

Length, 7 to 11 mm. Los Angeles County, California. Nine males and seven females, March to May.

Thereva novella, n. sp. ♂ same as *otiosa*, with these exceptions: Style of antennæ two-fifths as long as the third joint; pile and bristles of vertex and bristles of occiput yellowish-white; thorax destitute of black pile; knob of halteres brown, margined with yellow; veins of wings largely yellow, stigma also yellow and indistinct.

♀ differs from the ♀ of *otiosa*, besides in the particulars above mentioned, in that the front is destitute of the two round velvet-black spots, having instead a narrow, interrupted, dark-brown cross-band; eighth abdominal segment of hypopygium dilated, its pile largely yellow.

Length, 9 to 11 mm. Los Angeles County, California. Five males and one female.

Thereva fuscata, n. sp. Black, base of third antennal joint, tibiæ, and base of tarsi reddish. Head yellowish-gray pollinose, front with two transversely ovate velvet-black spots on its middle; pile of head pale yellow, that of the front mixed with black, bristles of occiput and of the antennæ black. First joint of the antennæ slender, scarcely wider than the second, third joint attenuate-ovate and about four times as wide as the second, nearly two-thirds as long as the third joint; style one-fifth as long as the third joint. Thorax yellowish-gray pollinose, marked with two light gray vittæ, the sides pale gray, the humeri and scutellum pale yellow, [illegible] pile on the thorax, pleura gray pollinose, [illegible] Knob of halteres brown. Abdomen [illegible] yellowish-gray pollinose, second and following segments shin-

ing brown ; pile of abdomen erect and largely black. Front and middle femora destitute of bristles. Wings yellowish gray, a hyaline streak in base of marginal cell, a darker gray cloud in apex of first submarginal and along front edge of the second submarginal cell ; stigma and a small spot at base of the second submarginal and of each posterior cell, dark brown ; fourth posterior cell closed and short petiolate.

Length, 10 mm. Washington. Received from C. W. Johnson, and collected by Prof. O. B. Johnson, after whom the species is named.

SOME NOTES ON MICHIGAN INSECTS, PRINCIPALLY COLEOPTERA, AFFECTING FOREST TREES.

BY C. H. TYLER TOWNSEND.

The following notes were presented to the Entomological Society of Washington, May 1, 1890, under the title of "Some insects affecting certain forest trees." They are herewith somewhat revised and sifted for publication, since the matter which follows is of some value.

The paper furnishes a record of certain insects, mostly coleopterous, which I found many years ago in Michigan affecting either the trunks or foliage of forest tress and shrubs and which I have since been able to identify in connection with my notes. All are southern Michigan records, and belong to the vicinity of Constantine. Many coleoptera found under dead bark, but which feed merely on decaying vegetable tissue, have been omitted. Such are Prionochæta, Scaphidium, Ditoma, Bactridium, Melanotus, Cis, Tenebrioides, Melandrya, Uloma, Platydema, Penthe, Cratoparis, and many others.

COLEOPTERA.

Brontes dubius, F.—Under bark of linden (fall) ; elm and butternut logs (May).

Paromalus æqualis, Say.—Under bark of decaying butternut and linden logs (May).

Hister leconteï, Mars.—In burrows under decaying bark of butternut, elm, and linden.

Adelocera aurorata, Lec.—One under bark of old oak log (Jan.)

Alaus oculatus, L.—Boring stumps and dead trunks of oak, hickory, poplar and linden.

Cardiophorus gagates, Er.—On oak leaves (May).

Elater manipularis, Cand.—Under decaying linden bark (Nov.)

Elater nigricollis, Hbst.—In hickory stump (Oct.); and poplar stump (Dec.)

Elater linteus, Say.—In decaying poplar stump (fall).

Elater apicatus, Say.—In decaying poplar stump (Dec)

Agriotes oblongicollis, Melsh.—On leaves of hazel (May); and beech (May, June).

Limonius auripilis, Say.—On beech foliage (May, June).

Limonius basillaris, Say.—On new oak and beech growth (May, June).

Acmæodera culta, Web.—On cut oak wood (July).

Agrilus ruficollis, F., *otiosus*, Say, *bilineatus*, Web.—On cut oak wood and rails (July).

Brachys ovata, Web —On foliage of beech and oak (May to July).

Brachys aerosa, Melsh.—Eating oak and hazel leaves (May); leaves of beech, elm, ironwood (*Carpinus*), (May, June).

Brachys aeruginosa, Gory.—On leaves of beech, elm, ironwood (*Carpinus*), (May, June).

Thanasimus dubius, F.—In numbers on piles of oak wood (May). In coitu (May 2).

Tarsostenus univittatus, Say.—Under bark oak stumps (Oct.); under bark butternut log (May).

Pedilus [illegible], Fab.—On leaves of oak (May).

Lacon[illegible], Lec.—On foliage of red oak (May, June).

Lacon[illegible], Lec.—On foliage of red oak (May).

Lac[illegible], Lec.—Swarming in red oaks (May).

[illegible], Mels.—Swarming in red oaks (May).

[illegible], Lec.—On red oaks (May). The last five species occur nearly all the year.

[illegible], Lec.—Eating leaves of willows (*Salix cordata*), (May, June).

[illegible], Lec.—Under bark of oak and butternut logs.

[illegible], Say.—May specimens found on a white oak fence post, beetles emerged from which they had emerged (June, July).

Dorcaschema nigrum, Say.—On hickory foliage (May, June).

Goes pulverulenta, Hald.—Dead beetle found in a cell in cut hickory.

Liopus alpha, Say.—On oak rails, and on fence posts under red oak tree (June).

Lepturges querci, Fitch.—On oak posts of fence under red oak tree (June).

Hyperplatys maculatus, Hald.—Same as preceding.

Saperda vestita, Say.—In sapwood, also in bark of dead linden trunk in all stages (May).

Saperda tridentata, Oliv.—Beetles and pupæ under bark of elm logs (May).

Donacia flavipes, Kby.—Twenty-seven taken on leaves of new oak growth (May 23).

Chlamys plicata, F.—On witch hazel (June).

Exema gibber, Oliv.—On witch hazel (June).

Cryptocephalus venustus, F.—On oak and hickory foliage.

Pachybrachys othonus, Say, *carbonarius*, Hald., *infaustus*, Hald.—On oak foliage.

Noda (Colaspis ?) convexa, Say.—On beech foliage.

Chrysomela scalaris, Lec.—On leaves of low sumac, hazel, linden.

Chrysomela multipunctata, Say. var. *bigsbyana*, Kby.—On leaves of low sumac *(Rhus)*.

Lina lapponica, L.—In numbers eating leaves of dwarf willow *(S. cordata)*, (May, June).

Blepharida rhois, Forst.—On low sumac.

Haltica inærata, Lec.—On foliage of ironwood *(Carpinus)*, beech and elm (May, June).

Odontota rubra, Web.—On beech, elm and oak foliage (May, June).

Diaperis hydni, F.—Twenty-five or thirty taken, Feb. 16, in groups in small passages in the inner wood of an old oak stump. Also found in same places later in the spring. When disturbed, they emit a yellowish

fluid which stains the skin, has a pungent odour, and turns alcohol to a crimson colour. The heads and legs of some worker termites dropped in the same alcohol became of a deep violet colour, but the heads of soldier termites, from their harder integument, remained unstained. These beetles exhibited considerable variation in the disposition of the black markings on their orange-red elytra. I could find no communication with their galleries from the outside. Their social hibernation is interesting.

Synchroa punctata, Newm.—Beetles and pupæ under bark of linden and elm logs (May).

Attelabus analis, Illig., *bipustulatus*, F., *rhois*, Boh.—On leaves of young hickory.

Magdalis armicollis, Say.—On elm foliage (June).

Anthonomus crataegi, Wlsh.—On beech foliage.

Mononychus vulpeculus, F.—On witch hazel (June).

Conotrachelus [illegible], Say.—On witch hazel (June).

[illegible] Say.—Very numerous under an isolated, [illegible]

[illegible]

[illegible] bark of an old [illegible] N. Y.

[illegible] Dr. Horn and Mr. [illegible]

[illegible] in large knots, [illegible] excrescence of [illegible] several feet. The [illegible]

[illegible] O. S., occurs [illegible] conspicuous [illegible]

THE PHALANGINÆ OF THE UNITED STATES.

BY NATHAN BANKS, SEA CLIFF, N. Y.

The family Phalangidæ is readily separable from the other families of Phalangida by having but one simple (not compound) claw at the end of each tarsus and having a claw at the end of palpus. The last (fifth) joint of palpus is nearly always longer than the next to last; an exception is the male of Protolophus. Our species have been described by Say (Complete Writings), Wood (Bull. Essex Inst., 1868), Weed (Bull. Ill. State Lab. Nat. Hist., 1889, and various articles in Am. Nat., 1887–1893), and Banks (Trans. Ent. Soc., Wash., 1891). The genera known to me may be separated by the following key:—

1. Body with two rows of large tubercles, male with fifth palpal joint shorter than fourth, female with third palpal joint forked..... *Protolophus.*
   Body without large tubercles, fifth palpal joint always longer than the fourth..... 2
2. A group of spines on the front margin of the cephalothorax, eye-tubercle with two rows of prominent spines..... 7
   Not with both of above characters..... 3
3. Three large spines on the second joint of palpus, eyes exceedingly large..... *Caddo.*
   Without such spines, eyes normal..... 4
4. Femur I., much shorter than body, in the females not as long as width of body..... 5
   Femur I., longer, or in some females but little shorter than body..... *Liobunum.*
5. Metatarsus I., without false articulations, femora and tibiæ I. and III. much thickened..... 6
   At least one false articulation in metatarsus I., femora and tibiæ normal..... *Leptobunus.*
6. Eye tubercle spinose..... *Globipes.*
   Eye tubercle smooth..... *Eurybunus.*
7. Second joint of palpus with prominent spines..... 8
   Second joint of palpus without prominent spines..... 9
8. No false articulation in metatarsus I., eye tubercle more remote from the anterior margin..... *Lacinius.*
   At least one false articulation in metatarsus I., eye tubercle farther forward..... *Oligolophus.*
9. Femora as narrow as, or narrower than eye-tubercle, fifth joint of palpus longer than the third and fourth together..... 10
   Femora wider than eye-tubercle, fifth joint of palpus not longer than the third and fourth together..... *Homolophus*

10 { Femur I. longer than width of body.....*Phalangium*
{ Femur I. not longer than width of body.....*Mitopus*

Trachyrhinus, Weed [Am. Nat., 1892], is unknown to me; it appears to be near Homolophus, but with more slender legs, more spinose palpi, with a different patella, and larger eye-tubercle. Wood's description of *P. favosum*, however, reads much like *Mitopus biceps*, Thorell.

These genera I arrange in four tribes.

PROTOLOPHINI.

This embraces the single genus Protolophus, remarkable for the structure of the male palpi.

Protolophus, gen. nov.

In the male the second, third and fourth palpal joints are greatly enlarged, and the fifth joint is a little shorter than the fourth; the claw at the end of the fifth is, however, distinct. The female has the palpi more normal, the fifth joint longer than the fourth, the third joint is prolonged on the inner side, as in Prosalpia, and the fourth has a small projection at tip on the inner side. The eye-tubercle is low, with two rows of small spines. The legs are short, femur II. being shorter than the body; tibiæ without false articulations. The dorsal parts of the first five abdominal segments are more united than those beyond, each of these five segments having a median pair of large tubercles. Two species are known to me.

Abdominal tubercles unarmed.....*tuberculatus.*
Abdominal tubercles with a few apical spines.....*singularis.*

Protolophus tuberculatus, n. sp.

Length, 8 mm.; femur I., 2.3 mm.

Colour—Gray to brownish, the cephalothorax gray, the dorsum of abdomen darker, somewhat reddish-brown. Body with a broad, darker, median stripe, beginning at the anterior margin of the cephalothorax and extending to the sixth abdominal segment, narrower and darker on the abdomen than on the cephalothorax. Just below the front margin of the cephalothorax are two small median spines. The venter is pale grayish with a few brown spots near the sutures, the tips of the mandibles black, the coxæ brownish, the trochanters yellowish, the femora, patellæ and tibiæ reddish-brown, the metatarsi yellowish, the tarsi gradually becoming darker, the abdominal tubercles black. The legs are covered with small spines, on each side of the coxæ there are rows of small black plates.

The female is similar, but the dorsum is more reddish, the venter more

mottled than in the male, and there are some brown spots on the basal joint of the mandibles above.

Southern California. Not uncommon.

Protolophus singularis, n. sp.

Similar to *tuberculatus*, but the abdominal tubercles bear from two to four spines. The anterior margin of the cephalothorax is more spinose; and the second and fourth joints of the palpi are much more enlarged than in that species; the eye-tubercle is also more spinose. The legs are more slender, especially the second pair. The body and legs are more brownish, and the palpi are mottled, the second joint of the mandibles very dark.

Southern California. Collection of Dr. Geo. Marx. One male.

CADDINI.

This tribe embraces only *Caddo agilis*, remarkable for its large eyes. It shows its relation to certain genera of the next tribe in having spines on the second palpal joint. One young specimen has a white band above. I have it from N. Y. and D. C.

OLIGOLOPHINI.

The very spinose character of the members of this tribe distinguish them from all their allies.

Oligolophus pictus, Wood.

This occurs in the Eastern States.

Lacinius ohioensis, Weed.

Ohio, N. Y.

Lacinius texanus, Banks. Psyche, 1893.

Texas.

Mitopus biceps, Thorell.

Described by Thorell in 1876 from Colorado; I have received specimens from L. M. Cockerell.

Phalangium cinereum, Wood.

The northeastern parts of the United States and in Canada. [A. D. MacGillivray].

Phalangium longipalpis, Weed.

Arkansas. This would be called Cerastoma by some European authorities.

HOMOLOPHUS, gen. nov.

Quite prominent spines upon the cephalothorax and eye-tubercle, and with transverse rows on the abdomen. Legs thicker than usual, the anterior femora being much thicker than the eye-tubercle is wide, almost as thick as the basal joint of the mandibles; femur I., is a little longer than the width of the body, tibiæ without false articulations. The fifth joint of palpus is not quite as long as the third and fourth together. This genus is related to Phalangium, but the last joint of palpus is shorter, and the legs are shorter and stouter.

Homolophus arcticus, n. sp.

Length, 6.4 mm.; femur I., 4.2 mm.

Colour—Cephalothorax yellow-brown, black in the middle behind; dorsum of abdomen black; legs dark red-brown, yellow at extreme base of the femora and on the trochanters; venter brown. Eye-tubercle with two rows of a few spines; cephalothorax with scattered spines, arranged much as in *Phalangium cinereum;* abdomen with six transverse rows of similar spines; posterior angles of the cephalothorax projecting and rounded with a few prominent spines. Legs stout, very spiny, having a few more prominent spines at tips of femora, patellæ and tibiæ; second pair of legs lost.

Commander Island, Siberia. Collection of Dr. Geo. Marx.

LIOBUNINI.

This tribe includes the more typical and common members of the sub-family.

GLOBIPES, gen. nov.

The principal character of this genus is the enlarged femora and tibiæ of legs I. and III., the eye-tubercle is low and with a few spines, legs short, but femur II. is longer than the body and more than twice as long as femur I. Metatarsus I. without false articulations. The palpi are normal.

Globipes spinulatus, n. sp.

Length, 3.5 mm.; femur I., 1 mm.

Colour, brown or reddish-brown, tip of abdomen more gray, dorsum somewhat mottled with brown, coxæ yellowish, trochanters and base of femora yellowish, remainder of femora, patellæ and tibiæ reddish, metatarsi yellowish, tarsi a little darker, palpi pale, tips of mandibles black. The female has two median white spots near the tip of the abdomen. The

palpi are very short, the patella and tibia somewhat enlarged, the fifth joint longer than the third and fourth together. The cephalothorax and abdomen are smooth; the legs have many small spines, most prominent on the enlarged parts of legs I. and III.; tibia II. has three false articulations. The legs of the female are longer and more slender than those of the male. The abdomen of the female is larger and pointed behind, while that of the male is somewhat truncate.

Southern California.

EURYBUNUS, gen. nov.

Eye-tubercle very low and smooth, cephalothorax with an elevation on the anterior margin bearing a few small spines. The segments of the dorsal shield of the abdomen are so closely united that their sutures are hardly discernible. The femora, patellæ and tibiæ of legs I. and III. are enlarged; femur II. barely twice as long as femur I., and a little longer than the body; metatarsus I. without false articulations.

Eurybunus brunneus, n. sp.

Length, 9 mm.; femur I., 4 mm.

Colour—Dorsum uniform brown, the margins of the abdomen a little white; venter grayish-white; coxæ, trochanters and part of the femora yellowish, a band near tip of femur brown, the extreme tip whitish; base of patella brown, the tip white; middle of tibia brown, the base and tip white; same with the metatarsus, except that the brown is not as dark; tarsi brownish; palpi and mandibles yellowish. Body very smooth, femora I. and III. with a few short scattered spines, similar spines on the under side of tibiæ and metatarsi I. and III., tibia with three false articulations.

Southern California.

LEPTOBUNUS, gen. nov.

Legs short, joints but little thickened, femur I. much shorter than the body; femur II. frequently not as long as the body. Eye-tubercle narrow, usually smooth. *L. californicus* is the type. In this species the palpal claw is smooth, and metatarsus I. has but one false articulation; lateral pore is very large and looks outward. In the two other species the palpal claw is dentate, metatarsus I. has several false articulations, and the lateral pore is like that of Liobunum. For these reasons the last two species may form another genus.

1 { Metatarsus I., with one false articulation ..... *californicus*
  { Metatarsi I., with several false articulations 2

2 { Dorsum smooth. ..... *maculosum*
  { Dorsum granulate ..... *grande*

Leptobunus grande, Say.

Liobunum similis, Weed.

Va., D. C., Ohio, Ill.

Leptobunus maculosum, Wood.

Pa., W. Va., Ohio.

Leptobunus californicus, n. sp.

Length, 6.6 mm.; femur I., 2.7 mm.

Colour—white above, mottled with brown and black, the vase-mark indefinite; beneath whitish, with a few brown spots; legs yellowish, with an apical brown ring on each joint. Eye-tubercle low and smooth; body smooth; legs smooth, except the tarsi, which have spines at each articulation. Legs quite stout; metatarsus I. with one and tibia II. with two false articulations; palpi with the fourth joint longer than the third; fifth joint about equal to the third and fourth together.

Southern California (Davidson).

LIOBUNUM, Koch.

Forbesium, Weed.

The genus Forbesium is based on young forms of previously described species. Liobunum is very rich in species; many forms remain to be described. I will mention but one, readily recognized by having two large yellow spots.

Liobunum bimaculatum, n. sp.

Length, 4.2 mm.; width of abdomen, 3.5 mm.; femur I., 11.9 mm.; femur II., 19.5 mm.

Colour—dark brown, with two large yellow spots over the juncture of the cephalothorax and abdomen; the eye-tubercle black; venter, palpi and legs yellowish; patellæ and tibiæ at tip brownish; metatarsi and tarsi somewhat brownish. Body short and broad; the end of abdomen bent under; the side-pieces of the sternum appear to be completely separated from the sternum proper; coxæ, venter and sternum with a few granules. Eye-tubercle moderately high; more than its length from the anterior margin, and with two rows of spines above. Abdomen with a few transverse rows of small, stiff hairs. Legs extremely long, with some small spines

and a few larger ones at the tips of the femora and patellæ; tibia I. without false articulations, tibia II. with several. Second joint of palpus with small spines beneath, the third and fourth joints about equal.

Southern California. Kindly loaned to me for description by Dr. Geo. Marx.

The remaining species of this genus are as follows:—*L. vittatum*, Say, *L. dorsatum*, Say, *L. nigropalpi*, Wood, *L. exilipes*, Wood, *L. verrucosum*, Wood, *L. ventricosum*, Wood, *L. calcar*, Wood, *L. bicolor*, Wood, *L. politum*, Weed, *L. elegans*, Weed, *L. longipes*, Weed, *L. nigripes*, Weed. All are from the eastern United States except *L. exilipes*, from California; this also occurs near Olympia, Wash. State (Trevor Kincaid).

CORRESPONDENCE.

UNIDENTIFIED BOMBYCIDS.

Sir,—In regard to Mr. Smith's note on page 164 in CANADIAN ENTOMOLOGIST for June, I would say that I am the authority for the reference of *Saligena personata* to *Raphia frater*, and for the fact that now a series of specimens of *Sphida obliquata* are in Brit. Mus. Coll. under the label of "Edema obliqua." I have not the Brit. Mus. lists before me, but this series of apparently bred specimens of *Sphida obliquata*, which I found on my second, were not in Brit. Mus. Coll. at my first visit, when I examined the collection, with a specimen of the moth, for the express purpose of identifying the species. They could not have escaped my notice. They must have been added subsequently to my visit and description. On this first occasion I discovered, quite misplaced, the type of the much more obscure species *Arzama densa*, Walk.; without this identification the name *Arzama* would have hardly been placed in our catalogues. I recognized *Sphida obliquata* as allied to the type of *Arzama densa* at a glance. I examined the *Notodontidæ* carefully, making several identifications, and the specimens now under *Edema obliqua* were not then there. A reference to our original paper in Tr. Am. Ent. Soc. Phil., will show that I examined the Notodontians carefully. The probability is, that the species must remain as catalogued by me, viz.: *Sphida obliquata*, G. & R., when the facts are all known. In cases where specimens are simply stuck without type labels under printed labels in Brit. Mus. Coll., they are not to be taken as Walker's type, when in any way disagreeing with Walker's descriptions. A. R. GROTE, Bremen.

A BLACK MALE OF PAPILIO TURNUS.

Sir,—Having been a constant reader of the ENTOMOLOGIST for the past ten or twelve years, I have never found anything published in your valuable journal as regards the capture of a black male of *Papilio Turnus*. In the annual report of the Entomological Society of Ontario, for 1889, on page 38, Mr. Fletcher writes at some length in regard to the Tiger Swallow-Tail butterfly *(Papilio turnus)*. The statement to which I wish to call your attention is on page 39, on the eleventh line from top of page, where he says: "*No specimen of the black male has ever been taken; the only approach to this melanic form is a beautiful suffused variety.*" No doubt but the author was about right, for I had examined other journals and had failed to find any account bearing upon this subject, as I had one or two beautiful Papilios in my collection, and was uncertain as to what they were. The other day I was out collecting, and to my great surprise captured a beautiful ♂ and ♀ of *Turnus* in copulation, so you see there is no question as to their identity. This beautiful black male *Turnus* resembles *Papilio Troilus* in some respects, having its wings black; primaries with a marginal row of rich cream-coloured spots, whereas in *Troilus* they are a light or pale yellow; secondaries with bluish lunules, while in *Troilus* they are green, running along the margin. The anal spot with a bluish crescent as in *P. Palamedes* and in *P. Cresphontes*, while the anal spot in *Troilus* is entirely orange. Tails slender and black. After being a collector of insects for the past twenty years, both in the south and north, this was indeed the first golden opportunity and I had the pleasure of the capture of a black male *Turnus*. Its distribution covers a wide area, reaching from the far north to the confines of the tropics, going by the variety name *Glaucus* in the south, just in the same manner as Papilio Machaon of the old world, which is to be found in England, France, Germany, Northern India and Japan, and a huge variety *Hippocrates*, of Northeast China, while *P. Polydorus* and *P. Alexanor*, strictly of European origin, are limited to a much smaller territory than either *Turnus* or *Machaon*. Whilst *P. Rutulus* and its varieties *Arizonensis* and *Ammoni*, resembling in general appearance *Turnus*, but somewhat smaller, and being distinguished by its having the yellow band which runs along the posterior margin on underside of primaries unbroken, while in *Turnus* it is disconnected, is found throughout the Pacific states, P. Eurymedon, its var. *Albanus*, *P. Daunus* and *P. Pilumnus*, all of which belong to the yellow tribe of Papilios, range within the confines of the western states, while *P. Œbalus*, which bears a close resemblance to *Turnus* except that the yellow shows a slight tinge of orange, is found in Mexico, and thus far, has never been found elsewhere even as a winged visitor. More fully will these matters be treated of in my forthcoming work on "The Geographical Distribution of Butterflies and Moths."

A. S. VAN WINKLE, Keota, Iowa.

Mailed August 2nd.

The Canadian Entomologist.

VOL. XXV. LONDON, SEPTEMBER, 1893. No. 9.

DESCRIPTION OF A PECULIAR NEW LIPARID GENUS FROM MAINE.

BY B. NEUMOEGEN, NEW YORK.

DYARIA, *nov. gen.*

Head prominent, with a high vertical tuft. Front nearly square, rather higher than broad; slightly convex. Vertex small, with a low, conical central projection. Ocelli absent. Eyes large, naked, reaching as far as the front and above the vertex. Antennæ inserted far apart, close to the margin of the eyes. In ♂ lengthily bipectinate, the pectinations diminishing gradually, the distal third being bare. To judge from the fragments of a ♀ specimen with broken off antennæ (only 6 joints left to judge from), the ♀ antennæ are apparently simple. Palpi exceeding front by two thirds their length; second joint very large, third small. Tongue weak, but moderately long, coiled. Thorax robust, about as broad as long.

DYARIA SINGULARIS, Neum. ♂.
(Enlarged about double its size.)

Primaries well drawn out, about twice as long as broad. Costa straight, apices pointed and exterior margins well rounded. Vein 1 free and straight, furcate at base. Median four branched. Vein 2 arising very much beyond middle of cell; 4 and 5 approximate at their origin, at lower angle of cell. Cell closed, rather narrow and near to the costal edge. Cross vein bent inwardly at centre. A long, very narrow accessory cell, reaching from the apex of discal cell more than half way to apex of wing, its sides in apposition except at the two extremities, so that it is closed for the greater part of its length. Vein 6 from the under side of accessory cell, near its origin; 7 and 10 from the end of accessory cell, on each side of a stalk, which becomes furcate very close to the apex of wing, thus forming veins 8 and 9. Vein 11 from the subcostal beyond the middle of the discal cell. Vein 12 free from base.

Venation of wings and legs of DYARIA SINGULARIS, Neum, ♀.
(Greatly Enlarged.)

A furcate, false discal vein in discal cell, and a distinct submedian fold.

Secondaries about as broad as long; exterior margins well rounded, bluntly pointed at angle. Anal margins straight. Two internal veins. Median four branched, as in primaries. Vein 3 arising near lower angle of cell; 4 and 5 close together from the lower angle of cell, which is pointedly drawn out. Cell closed. Cross vein angulated, its lower, longer limb obliquely drawn out; its upper approximately at right angles to the subcostal. Veins 6 and 7 from the upper angle of the cell, 7 united to 8 at a point about one-fifth of its length from origin, then free to exterior margin. Vein 8 free from base, except at its junction with 7, nearly straight, but slightly bent at the junction, not sinuate. Traces of a discal vein.

Frenulum present; in ♀ a long double spine; in ♂ a long spine fastened into a loop on the subcostal vein of primaries.

Abdomen long and slender, exceeding secondaries by about one-fourth, thickest centrally, gently tapering; slightly tufted. Legs long and slender; the middle pair the longest, the others subequal. Anterior tibiæ unarmed, short, not longer than the first tarsal joint, with an epiphysis less than its own length, projecting with conical tip. Tarsi feebly spinulated, with terminal claws. Middle tibiæ with a pair of long, sharp apical spurs. Hind tibiæ slightly enlarged centrally, quite long and thick, with submedian and apical pair of long spurs.

Dedicated to my faithful co-labourer and friend Mr. H. G. Dyar.

This is a very queer genus; although not a typical Liparid, I do not see any other way but to place it among the Liparidæ of our fauna.

DYARIA SINGULARIS, *nov. spec.*

Eyes black. Head, as well as hairy tuft on latter, yellowish-gray. Vertex between the stems of antennæ blackish. Thorax yellowish-gray interspersed with black hair.

Wings thickly scaled, whitish-gray with the following maculations in black or light brown :—

Primaries: Three transverse lines in black. The t. a. line curving outwardly at centre. The basal space enclosed by it, densely scaled with blackish-brown hair from costa to interior margin. The t. p. line undulating, dented inwardly between median vein and interior margin. The cellular, as well as median space enclosed by the t. a. and t. p. lines, is whitish, densely dotted with black granules. A prominent black discal spot, tufted with yellowish hair. A subterminal line of black dots; space between the latter and the t. p line of light brown. Subterminal space gray, with blackish shades along veins, and a terminal line of black dots at intersection of veins. Yellowish-brown fringes.

Secondaries: An undulating mesial line, and a subterminal line of subtriangular dots, both of blackish colour. Mesian space light brown, subterminal space gray with black granules. A blackish terminal line, and a heavy tuft, along anal margin, of yellowish-gray. Fringes of the same colour. The basal space whitish with black grains. In the centre a distinct black discal spot, heavily tufted. Abdomen yellowish-gray, with black segmentary lines and white dorsal hair along latter.

Below, both wings of lustrous yellowish-gray, showing blackish tints in apical part of submedian space of primaries, as well as faint traces of the t. p. line. Very faint indications of transverse lines on secondaries. Lower part of thorax blackish. Legs yellowish-gray. Fore tibiæ and tarsi blackish, the latter dotted with yellowish at sections.

Expanse of wings, 26 mm.

Length of body, 8 mm.

Habitat: Bangor, Maine.

Type: ♂, coll. B. Neumoegen.

Caught at electric light by Prof. Carl Braun, who also sent me the fragments of a ♀ just good enough to make out the venation and to lead me to the belief that the ♀ antennæ are probably simple.

This is one of the most singular little Bombycids of our fauna, easily distinguished by its heavy scales and the hairy tufts on collar and discal dots. It resembles West Indian genera, as Prof. Smith rightly remarked to me, but Prof. Braun assured me of its Maine origin.

THE SPECIES OF EUCOPTOCNEMIS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In 1874 I proposed the generic term *Eucoptocnemis* for the *Heliophobus fimbriaris* of Guenée, Noct. I., 172, whose statement that the species had two terminal spines on the anterior tibiæ rendered its reference to the genus *Heliophobus* of Boisduval improbable. In reality our species appears not congeneric with the European *Heliophobus hispidus*. At the time of proposing the genus I had no material. Later on I examined two or three specimens taken near the coast of Massachusetts, but they were so worn that I could not satisfactorily identify the species, while they probably belonged to Guenée's *fimbriaris*. In a considerable collection from New York, which I have identified for the Bremen Museum, I find, however, quite a number of specimens which I determine as Guenée's *fimbriaris*; the material is generally well preserved, most of the insects are quite or sufficiently perfect, and both sexes are represented. An examination gives us the following structural characters:—The abbreviated anterior tibiæ show two longer terminal spines and a row of shorter spinules on each side. Besides the pair of calcaria, the inner spur of which is shortest, the middle tibiæ are also provided with spinules; the hind tibiæ, with two pair of spurs, are also armed. The testaceous legs are sparsely clothed with pale hair (allowing the armature to be easily studied), and in this respect showing affinity to our Western *Cladocera niveivenosa*, Grt. The antennæ are long, in the male finely bipectinate, the pectinations gradually decreasing to the tips, in the female simple. The front is smooth, without tubercle. The palpi are somewhat divaricate, with short terminal article. The thorax is short and square, somewhat densely clothed with hair-like scales, pilose. The abdomen is comparatively short, not exceeding the secondaries, untufted, thinly scaled and rather weak. Wings broad, with the fringes long and even, unicolorous. Eyes naked, adorned with a variable pattern of black markings, unlashed.

EUCOPTOCNEMIS FIMBRIARIS, Guen., V., 172 (*Heliophobus*).

Grt. Bull. B. S. N. S. I., (13), 1874.

9 ♂ s, 4 ♀ s. Forewings broad, triangulate, silky, of a more or less determinate grayish-red, in some specimens the red is quite clear, somewhat brickish in tint; this is the case in all the females examined. Maculation subobsolete. Orbicular reduced to a dark or blackish spot, which in one or two individuals shows a few central pale scales. Reni-

form upright, elongate, narrow, slightly constricted medially, yellowish, followed by a blackish arc and a more or less obvious blackish shading. Under the glass, the black scales are seen to extend along the folds and veins between the reniform and the t. p. line, while the surface of the wing, generally, is seen to be sparsely peppered with black scales. The reniform is also preceded by a curving black outline and the yellowish colour spreads a little above and below, so that Guenée's comparison of its total shape to an elongated letter x becomes intelligible, though by no means obvious. These black markings tend to be lost in the rubbed examples. The lines are seldom continuous and tend to become dotted or wholly lost, or are merely marked on costa. The t. p. line consists apparently of pale venular spots preceded by black dots. The t. a. line is in some specimens indicated, indented above and below, medially rounding outwardly. In one specimen the base of the wing shows a slight gathering or patch of black scales. Noticeably in the female specimens, which are perhaps fresher, the median lines appear as faint continuous black shades. The subterminal line is indicated by the slight difference in shade between the paler terminal and darker subterminal fields, the latter of which is marked on costa by a darker shading. A more or less obvious terminal line, sometimes well marked by interspaceal disconnected lunular marks. Hind wings variable in colour, usually quite pale with faint diffuse terminal shading, silky, in one male quite dark; terminal line variable, occasionally absent. Palpi blackish outwardly, and behind the eye usually some blackish scales. Thorax like forewings; front and collar somewhat paler. Abdomen quite pale or whitish. Beneath, the forewings are darker, the hind wings pale, the colours even, all markings lost. The male specimens vary in expanse from 28 to 36 mil.; Guenée gives 35 mil. The females average 33 mil., as near as may be.

Var. SORDIDA.

5 ♂s, 4 ♀s. The colour is entirely sordid grey, without trace of red. Under the glass I have, however, detected about costa a faint reddish tinge in some of the paler specimens. The yellow tinge of the reniform is less obvious. The lines are generally more distinct and continuous, and even the median shade line is often evident running near the reniform, which latter seems to indicate in this species the closure of the median cell, and is always the most prominent mark of *fimbriaris*. In one specimen of *sordida*, the basal patch is marked. There can be no doubt that this is

an extraordinary and easily recognizable colour variety of *fimbriaris*, although at first sight it might be taken for a distinct species. From the present collection it would seem to be as common as the typical reddish form. Types in Mus. Brem.

Eucoptocnemis fimbriaris would seem to be a local insect, since I have, with the one exception above noted, never before met with it in any collection submitted to me, nor have I ever collected it myself. It would seem to be not only quite variable, but its scanty markings are also easily removed by attrition, when it presents a vague and pale appearance, only the reniform being indicated. The insect is best known by its bipectinate male antennæ, its pilose thorax and weak body parts, the armature of its thinly clothed legs, the well-developed fringes, silky and comparatively wide wings. Superficially it rather resembles some of the red species of *Agrotis*. It is probable that the median lines, if fully developed, would be double, with pale included shade, judging from those specimens in which they are marked on costa. They would then correspond with the yellowish reniform, which appears as a broad abbreviated line or bar, edged with black. But, in the specimens before me, the lines are usually obliterate and, even in one fresh male, their location can be barely made out, though with the help of the microscope. I trust before long some locality will be found for this interesting noctuid, and its history be fully made out.

NORTH AMERICAN THYSANURA.—III.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Synopsis Family JAPYGIDÆ.

The family *Japygidæ* has representatives in almost all parts of the world. Nearly a dozen species have been described, the majority of which are from Europe. The species are local and rare, and not usually found north or south of about 40° of latitude. Only a single genus is known—*Japyx*.

JAPYGIDÆ.

Antennæ multiarticulate; prothorax minute; tarsi biunguiculate; claws equal; abdomen with ten segments; segments one to seven with bristle-like rudimentary abdominal appendages; caudal appendages unsegmented, horny, pincer-like.

The characters of the single genus are the same with those of the family.

The species can be easily separated by means of the following key :—

A.—Right arm of the forceps with a single large tooth.

B.—Antennæ with forty-five to forty-eight segments.....
.....*Saussurii*, Humbert.

BB.—Antennæ with about thirty segments.....*subterraneus*, Pack.

AA.—Right arm of the forceps with two large teeth; antennæ with twenty-four segments.....*americana*, MacG.

Japyx Saussurii, Humbert.

Head quadrangular, not broader than long; antennæ 45–48-jointed, segments cylindrical; prothorax very little more than half as broad as the head, truncate in front; abdomen broader behind, segments immaculate, segments one to four rounded on the sides behind, fifth and sixth with their hind angles obtuse, the seventh slightly broader than sixth, much broader and overtopping the eighth, emarginate behind, the posterior angles produced in long, slender spines, lateral margins broadly rounded, seventh and eighth subequal in length, the eighth broadly, deeply, acutely emarginate before, the posterior angles not produced, the sides straight, ninth one-third the length of the eighth, posterior angles not produced, tenth slightly shorter than the forceps, the tenth and forceps together slightly longer than the four preceding segments; right arm of the forceps slightly broader than the left, inner margin concave, a large tubercle at middle, two smaller rounded tubercles before the larger tubercle, equidistant from the larger tubercle and from each other; beyond the larger tubercle the inner margin is slightly convex, with smaller tubercles, which become smaller and smaller, from the large tubercle for two-thirds the remaining length of the arm, the remaining third smooth; the left arm is broadest at base, with a large tubercle just before the middle, a smaller tubercle midway between the base and the large tubercle, beyond the large tubercle for a short distance there are small rounded tubercles, beyond which the inner margin is crenulate, the apical half beyond the large tubercle is smooth; the antennæ, underside of the legs, body and forceps covered with stiff yellow bristles; segments 1–7 with rudimentary appendages, the apical bristle long, stout, apical half brown.

Length, 20 mm.; length of the antennæ, 8 mm.; length of the abdomen, 13 mm.; length of the last abdominal segment and forceps, 5 mm.

Habitat—Orizaba, Mexico (Lawrence Bruner).

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subterraneus, Pack.

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1893.—*Japyx*, MacGillivray, CAN. ENT., XXV., 173.

americana, MacG.

1893.—*Japyx*, MacGillivray, CAN. ENT., XXV., 174.

A NEW SPECIES OF HYPOPTA.

BY HARRISON G. DYAR, NEW YORK.

An interesting species of Hypopta has been sent to me by Mr. T. D. A. Cockerell, from Las Cruces, New Mexico. It appears to be undescribed.

HYPOPTA THEODORI, *n. sp.*

White; head white, the large eyes black; pectinations of antennæ blackish; collar white; thorax clothed with light gray hairs, mixed with white; legs heavily clothed, obscurely annulate with gray near the tips. Abdomen banded with clouded pale gray above, white below. Fore-wings white, the basal half immaculate except for a few minute black dots along the costal edge and internal margin. These dots become more distinct toward the apex on costa. In the interspaces, and beyond the cell from vein 2 to apex of wing, is a series of diffusely clouded, strigose, pale purplish-gray patches, separated by a white space along the veins, and divided alsotransversely in a somewhat irregular manner. Along the discal cross-vein and near the origin of the discal and subcostal venules, the colour of these markings shades into blackish, where they abruptly terminate. Terminally, they become more obscure and strigose, leaving the fringe white. Hind wings similarly marked, but the markings are entirely pale purplish-gray, and form a series of intervenular clouded spots in three or four indistinct rows between middle of wing and margin. Beneath the markings are repeated in a somewhat leaden gray, rather more diffusely than on upper surface. Costæ of both wings with a row of gray dots and terminal dots on both. Fringe white, as above. Expanse, 29 mm. Length of body, 15 mm.

Described from a single example taken July 16, at Las Cruces, New Mexico, "a dry, flat, sandy locality, with hardly any trees but cottonwood and cultivated fruits. Its altitude above the sea is 3,800 feet." I have named the species in honour of Mr. Cockerell, whose labours in the entomological field are worthy of general recognition.

A NEW LECANIUM FROM CANADA.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

In a box of Canadian Coccidæ lately sent to me by Mr. J. Fletcher, there are several species of *Lecanium*, including one which appears to be new, and is described herewith.

Lecanium Fletcheri, n. sp.

Belongs to subg. *Eulecanium.*

♀ Scale dark reddish-brown, hemispherical, shiny, not at all elongate, more or less wrinkled or with depressions; posterior cleft short, with one or two filaments of white secretion protuding from it. Length, 2 two-thirds mm., breadth nearly the same; height, 1½ mm. (apex depressed).

Derm yellowish-brown (prepared by boiling in caustic soda); distinctly reticulate, reticulations mostly hexagonal and pentagonal. Gland pits distinct towards the margin, numerous, large, sometimes in pairs. Margin with short simple spines, not very numerous.

Legs very small, ordinary; femur longer than tibia; tibia about ¼ longer than tarsus. Tarsal knobbed hairs very long and slender, with distinct though small knobs.

Antennæ 7-jointed; 1 longer than broad, 2 shorter than 1 or 3, 3 and 4 about equal, hardly equal to 1; 5 and 6 equal, and much shortest; 7 about or nearly as long as 5 + 6, and about as long as 2, or a little shorter. Formula 1 (34) (27) (56). The seventh joint has a false joint about its middle, which in one antenna was so distinct that it was difficult not to believe it a true joint. First joint with a long hair, second with two hairs, 4 and 5 each with a hair, 6 with two, 7 with three distinct hairs.

Larva: Of the usual shape, pale-yellowish; caudal filaments nearly straight but with an outward curve, the ends usually bending inwards and crossing. Each side of the abdomen with 7 short hairs. Last joint of antennæ emitting four long hairs. Legs with clubbed digitules about twice as long as the claw, and long tarsal clubbed hairs.

Food-plant: The specimens are labelled, "on Thuja, 'cedar.'"

Hab.: No locality is given by Mr. Fletcher; very probably the specimens were on a cultivated tree at Ottawa.

L. Fletcheri differs decidedly from any species hitherto found on coniferous plants, and seems most nearly allied to *L. quercitronis*, which it much resembles. Mr. Fletcher sent me some scales on *Quercus Coccinea*, which I believe to be *L. quercitronis*, Fitch. *L. Fletcheri*, compared with these, is shorter and more globose, and the posterior cleft is decidedly shorter.

Parasite: In a scale of *L. Fletcheri* I found three specimens of a Chalcidid parasite. I have not identified the species (very likely it is undescribed), but the following descriptive notes will probably suffice for its recognition :—

Head and thorax dark metallic green; abdomen brown, shovel-shaped; ovipositor just projecting. Eyes hairy. Antennæ brown, with the two joints before the club white. Tarsi 5-jointed, first joint of middle tarsus longer than 2 + 3 + 4, last longer than 3 + 4. Middle tibia with a very stout, straight spur, but front tibiæ with a smaller curved spur. Front femora brown, with the end white; middle femora whitish tinged with brown; hind femora all brown. Front tibiæ brown, with the end white; middle tibiæ white, with a brown cloud on proximal half; hind tibiæ brown, with both ends white. Tarsi all white. Wings hyaline; stigmal club bifid. A hairless line springs from near stigmal vein and proceeds obliquely downwards and inwards. Three long hairs spring from a point on the side of the abdomen.

SYNOPSIS OF THE DIPTEROUS GENUS PSILOCEPHALA.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

The following table contains all the species of *Psilocephala* known to me as occurring in America, north of Mexico, with the addition of one species from Jamaica, West Indies. The *Thereva crassicornis*, Williston (Trans. Am. Ent. Soc., XIII., 293, *non* Bellardi), is a true *Psilocephala;* California specimens collected by Mr. O. T. Baron were submitted to me by Mr. J. M. Aldrich, of Brookings, South Dakota, who kindly placed his Therevidæ at my disposal. The *Thereva tergissa*, Say, is also a *Psilocephala;* specimens from Florida, the habitat of Say's original specimens, were contained in a very interesting collection of Therevidæ sent me by Mr. C. W. Johnson, of Philadelphia, Pa., who had identified the specimens in question as probably belonging to Say's species. As I cannot find that Say's name had previously been used in this genus, I have adopted it in preference to the later one, *corusca*, proposed by Wiedemann. *Psilocephala erythrura*, Loew, is evidently a synonym of *pictipennis*, Wied.

The *Thereva nigra* of Say, although placed in *Psilocephala* by Osten Sacken (Catalogue of the described Diptera, page 95), is a true *Thereva;* in his original description, Say distinctly says: "Hypostoma and all beneath with gray minute hair." I have a *Thereva* from Southern California which agrees in all respects with Say's description, and as other species

of this family are known to extend across the continent (I have examined specimens of *Thereva comata* from California and New Hampshire, *Psilocephala haemorrhoidalis* from New Jersey to Arizona), there is strong reason for believing that this is the true *Thereva nigra* of Say. For the species that has hitherto borne Say's name in collections, I have adopted Macquart's name of *haemorrhoidalis* (described under *Thereva*), since it is very probable that this author had specimens of the present species before him when drawing up the description to which the above name is attached.

Psilocephala melampodia, platancala, variegata and *levigata* are unknown to me except from the descriptions; of the remaining species I have seen only males of *melanoprocta* and *notata*, and only females of *rufiventris* and *scutellaris*.

The table of species is as follows:—

1. Fourth posterior cell open; front wholly opaque and covered with pollen 2
   Fourth posterior cell closed and usually petiolate 10
2. Femora black, or blackish-brown 3
   Femora and knob of halteres yellow ..... { *Slossoni*, n. sp. / *montivaga*, n. sp.
3. Wings destitute of blackish spots, except sometimes on the cross-veins 4
   Wings marked with over a dozen blackish spots, many of which are not situated on the cross-veins; abdomen wholly opaque; antennal style nearly half as long as the third joint ..... *tergissa*, Say.
4. Knob of halteres blackish-brown 5
   Knob of halteres, and hypopygium of male, yellow; first and third antennal joints subequal in length, the style nearly half as long as the third joint ..... *morata*, n. sp.
5. Thorax marked with light and dark coloured vittæ 6
   Thorax not vittate 8
6. Tibiæ yellow 7
   Tibiæ black, abdomen of female largely shining. *melampodia*, Loew.
7. First joint of antennæ much longer than the third, and extremely robust; California species ..... *crassicornis*, Will.
   First joint of antennæ much shorter than the third and not unusually robust; Florida species ..... *festina*, n. sp.
8. Tibiæ black, cross-veins of the wings not bordered with brown;

California species 9
Tibiæ yellow, cross-veins of wings bordered with brown ; Eastern species ..... *variegata*, Loew.
9. Third joint of antennæ scarcely longer than broad, pile in front of the halteres, and on the abdomen and legs, wholly white ..... *baccata*, n. sp.
Third joint of antennæ twice as long as broad, pile in front of the halteres, and on the abdomen and legs, largely black. *pavida*, n. sp.
10. Scutellum black 11
Scutellum orange-red, wings beyond the middle marked with two dark gray cross-bands ..... *scutellaris*, Loew.
11. Abdomen black 12
Abdomen largely orange-red, wings beyond the middle marked with two dark-gray cross-bands ..... *rufiventris*, Loew.
12. Wings destitute of dark-gray cross-bands 13
Wings beyond the middle marked with two dark-gray cross-bands, much abbreviated in the male ; two widely separated thoracic vittæ, and the apex of the scutellum, deep velvet black ..... *pictipennis*, Wied.
13. Front wholly opaque and covered with pollen, tibiæ largely yellow 14
Front partly shining 16
14. Knob of halteres, squamosels and palpi, yellow 15
Knob of halteres, squamosels and hypopygium of the male, black ; eastern species ..... *melanoprocta*, Loew.
15. Antennæ yellow ; California species ..... *marcida*, n. sp.
Antennæ black ; Pacific species ..... *obscura*, n. sp.
16. [illegible] 17
[illegible] ; California species. *costalis*, Loew.
17. [illegible] 19
Knob of halteres and hypopygium of male yellow, front shining 18
18. [illegible] as long as the third, wings [illegible] ..... *Aldrichii*, n. sp.
19. [illegible] 21
[illegible] 20
20. [illegible] ; wings [illegible] ..... *notata*, Wied.

Pollinose spots separated by a wide interval; wings smoky-brown ..... *Johnsoni*, n. sp.

21. Front shining except on each lower corner 22
Front having the lower third opaque pollinose ..... *munda*, Loew.

22. Costal cell blackish-gray, veins bordered with brown *platancala*, Loew.
Costal cell hyaline, veins not bordered 23

23. Pollinose spots on lower corners of the front contiguous .. *notata*, Wied.
Pollinose spots separated by a wide interval .. *haemorrhoidalis*, Macq.

Psilocephala festina, n. sp.— ♂ Black, the abdomen brownish, the tibiæ and base of tarsi yellow. Front and face silvery-white pollinose, eyes narrowly separated by a white pollinose interval; first antennal joint two-thirds as long as the third, style slender, cylindrical, nearly half as long as the third joint, the latter one and one-fourth times as wide as the second joint; bristles of antennæ and of upper part of occiput black, pile of lower part of occiput and of the mouth parts white. Thorax lightly white pollinose and with three grayish-black vittæ, pile very short, mixed white and black, bristles black, pleura and scutellum white pollinose, scutellum bearing only two bristles. Abdomen wholly silvery-white pollinose and sparse white pilose, that on the hypopygium and on the fourth and following segments of the venter largely black; wings hyaline, apex of subcostal cell yellowish, fourth posterior cell broadly open.

♀ Same as the ♂, except: Front grayish-white pollinose. Abdomen shining, except a white pollinose spot on each side of the first, fifth and sixth segments and a crossband on the posterior margin of the second and third segments. Length, 6 to 7 mm. Florida (Johnson).

Psilocephala morata, n. sp.— ♂ Same as *festina*, with these exceptions: Palpi, knob of halteres and hypopygium yellow; upper third of the front brown pollinose, eyes not separated by a white interval; first antennal joint nearly as long as the third, the latter nearly twice as wide as the second. Thorax opaque, grayish-black pollinose. Scutellum bearing four bristles. Pile of entire venter white.

♀ Same as the ♂, except: Lower third of front white pollinose, the remaining portion blackish brown pollinose. Abdomen shining black, first segment and posterior margins of the second, third, fifth and sixth segments white pollinose, the narrow hind margins of the first three segments white; sparse pile of abdomen and venter largely black, except that of the first segment, which is light-coloured. Wings grayish-hyaline,

the stigma yellowish. Length, 6 to 7 mm. New Jersey, Florida (Johnson).

Psilocephala baccata, n. sp.—♂ Wholly black, including the tibiæ, halteres and hypopygium; posterior margin of the second and third abdominal segments, both dorsally and ventrally, sometimes narrowly white. Pollen of face grayish-white, that on the lower half of the front somewhat brownish, on the upper half black; pile of head white, a few on the front and vertex black, bristles of occiput and of antennæ black. First joint of antennæ nearly twice as long as broad, the third joint once and a-half as broad as, but not quite as long as, the first, being scarcely longer than broad. Thorax very lightly gray pollinose, not vittate, the pile and bristles black, the surface sparsely covered with appressed light-yellow tomentum. Pleura, abdomen and venter densely silvery-white pollinose and white pilose, pile of abdomen appressed. Pile of femora and coxæ white, the bristles, as well as those of the tibiæ and tarsi, black. Wings hyaline, stigma brown; fourth posterior cell open.

♀ Same as the ♂, with these exceptions: Pollen on upper three-fourths of front brownish-gray, that on the lower fourth white and with a round black spot next each eye at the junction of these two colours. Abdomen and venter shining black, the posterior margin of the second, third and fifth segments silvery-white pollinose, broadest on the fifth.

Length, 5 to 7 mm. Los Angeles and San Bernardino Counties, California. Twelve males and two females, in May.

Psilocephala pavida, n. sp.—♂ Differs from the above description of *baccata* only as follows: Third joint of antennæ twice as long as broad. Pile in front of halteres largely black; pollen of abdomen black, that on posterior margin of the second and third segments light-gray; pile of abdomen black, that on the first segment and apices of the remaining segments whitish. Pile of coxæ and femora largely black.

Length, 6 mm. Los Angeles County, California. A single specimen; in April.

Psilocephala montivaga, n. sp.—♀ Black, the knob of the halteres, femora, tibiæ, and base of the tarsi, yellow. Front brown pollinose, that next the antennæ yellow, a spot on each side next the eyes and a median triangle, black pollinose; face yellow pollinose; pile and bristles of antennæ, pile of front and bristles of occiput, black, pile of occiput and of mouth parts white. Antennæ of nearly an equal width, the third joint tapering slightly to the apex, first joint three-fourths as long as the third,

style one-fifth as long as the third antennal joint. Thorax yellow pollinose, that each side more gray, marked with three broad black stripes; pile of thorax short, sparse, mixed black and yellow, the bristles black; pleura gray pollinose, its pile white. Scutellum black pollinose, that on the margin grayish-yellow, its pile sparse, yellow, the four bristles black. Abdomen shining, except the first segment, base of the second and sides of the first four segments, which are gray pollinose; pile of the first four segments mixed yellow and black, that on the remaining segments wholly black. Wings grayish-hyaline, stigma yellow, fourth posterior cell broadly open.

♂ Same as the ♀, except that the abdomen is wholly silvery-white pollinose, its pile wholly yellow; hypopygium yellow, its pile yellow and black. Length, 10 to 13 mm. Los Angeles County, Cal. One male and two females, in June.

Psilocephala Slossoni, n. sp.—♀ Black, the palpi, halteres, femora, tibiæ, and base of tarsi, yellow. Face and front grayish-brown pollinose, front with two velvet black spots at its middle adjacent to the eyes; pile of front, occiput, mouth parts and of antennæ whitish, bristles of antennæ and of upper part of occiput black; third antennal joint three-fourths as long as the first, scarcely wider than the second, first joint nearly twice as wide as the second, the style one-third as long as the third joint. Thorax brownish-gray pollinose, marked with two narrowly separated median grayish-black vittæ and with a much broader lateral one; pile of thorax light-yellow, the bristles black; pleura whitish pollinose and white pilose. Scutellum brownish-gray pollinose, white pilose, its four bristles black. Abdomen grayish-brown pollinose, that on apex of each segment broadly light-gray, the pile whitish. Wings gray, lighter in the middle of the cells, leaving a dark-gray border to the veins; stigma brown, fourth posterior cell broadly open.

Length, 10 mm. New Hampshire (Johnson). A single female specimen, collected by Mrs. A. T. Slosson, after whom the species is named.

Psilocephala Aldrichii, n. sp.—♂ Black, the knob of the halteres, hypopygium, tibiæ and base of tarsi yellow, posterior margin of the second and third abdominal segments white. Front shining, its lower corners not extending halfway to base of antennæ, white pollinose, like the face. Pile of mouth parts and of occiput white, that of the cheeks largely black, bristles of upper part of occiput and of the antennæ also black. First joint of antennæ three-fourths as long as the third, the

latter narrowly lanceolate, six times as long as the style. Thorax somewhat shining, marked with two white pollinose vittæ scarcely half as wide as the interval between them, and sometimes indistinct; pile of thorax and of scutellum whitish or yellow, that of the pleura white; scutellum bearing four black bristles. Abdomen lightly white pollinose, its sides, except on the first segment, shining, the pile white, that near the apex below and on the hypopygium sometimes partly black. Wings hyaline, the veins and stigma light-yellow; fourth posterior cell closed and petiolate.

♀ Same as the ♂, except that the abdomen is not wholly pollinose, and its pile is largely black. Length, 7 to 8 mm. New Jersey (Johnson), Montana, Wyoming (Aldrich), and California. Four males and one female, in July. I take pleasure in naming this species in honour of Mr. J. M. Aldrich, from whom one of the specimens was received.

Psilocephala Johnsoni, n. sp. — ♀ Black, the femora, tibiæ, base of tarsi, and posterior margin of the second, third, fourth and fifth ventral segments, yellow. Front shining, each lower corner and the face white pollinose; bristles of antennæ and of upper part of occiput black, pile of lower part of occiput and of the mouth parts white; first antennal joint slightly longer than the third, the latter one-fourth wider than the second, style one-fifth as long as the third joint. Thorax grayish-brown pollinose, marked with two widely separated light-gray pollinose vittæ, the sides broadly shining; pile of thorax short, and like the bristles, black; pleura white pollinose, its pile white. Scutellum shining, except the gray pollinose margin, its bristles black. Abdomen shining, the first segment lightly white pollinose, posterior margins of the second and third segments white, a large white pollinose spot on each side of the fifth segment, the two spots almost contiguous; pile of abdomen mostly black; venter white pollinose, pile of the first three segments white, the rest black. Wings smoky-brown, the middle of some of the cells lighter, stigma darker brown, fourth posterior cell closed and petiolate.

Length, 9 mm. Florida. A single specimen received from Mr. C. W. Johnson, to whom it gives me pleasure to dedicate this interesting species.

Psilocephala marcida, n. sp. — ♂ Black, the antennæ, proboscis, palpi, halteres, hypopygium, femora, tibiæ except apex of each, and base of tarsi, yellow, the femora and abdomen sometimes brown; posterior margin of the second, third, fourth and fifth abdominal segments, both dorsally

and ventrally, white. Head (usually) and entire body densely white pollinose, but that of the head sometimes yellow; the pile white. Antennæ having the first joint once and a-half as long as broad, slightly shorter than the third joint, the latter nearly as broad as long. Wings whitish hyaline, stigma yellow; faint clouds are perceptible on the cross-veins; fourth posterior cell closed and petiolate.

Length, 8 mm. Los Angeles and San Diego Counties, California. Two specimens.

Psilocephala obscura, n. sp.— ♀ Black, the palpi, proboscis, tibiæ, base of tarsi, knob of halteres, posterior margins of the second, third and fourth abdominal segments, and the greater portion of the three following segments, yellow. Front and face brownish-gray pollinose, short pile of front, bristles of antennæ and of upper part of the occiput, black, pile of lower part of occiput and of the mouth parts white; first and third antennal joints subequal in length, style one-third as long as the third joint, the latter nearly twice as wide as the second joint. Thorax grayish-brown pollinose and with two widely separated light-gray pollinose vittæ; pile of thorax mixed yellow and black, the bristles black; pile and pollen of pleura white, scutellum grayish-brown pollinose, that around the margin light-gray, the four bristles black. Abdomen shining, the first segment lightly pollinose, posterior margins of the second, third and fourth segments, and greater portion of the fifth and sixth, white pollinose; pile of first two segments yellowish, that on the remaining segments and on the venter largely black. Wings hyaline, stigma yellow, fourth posterior cell closed in the margin.

Length, 7 mm. Kingston, Jamaica (Johnson). A single specimen.

ON SOME LEPIDOPTEROUS LARVÆ ON ALFALFA.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA, W. I.

During the last two years a considerable number of rather small lepidopterous larvæ have been found on alfalfa *(Medicago sativa)* in Southern New Mexico. In the material collected there are nine distinct species represented. None of them have been bred. These larvæ are of considerable economic importance, as they occasion a certain amount of injury to the alfalfa crop, which is the surest and most paying crop of the Mesilla valley. They are of some scientific interest also, since hardly anything is recorded of alfalfa insects. It is therefore thought advisable to publish the following descriptions of these larvæ, which were made

some time ago, and which will serve to identify them on the alfalfa plant hereafter, besides giving an idea of the forms which occur on alfalfa in this locality. They were all collected in Las Cruces. The figures in parentheses refer to the alcoholic specimens of the species in the entomological collection of the New Mexico Agricultural Experiment Station.

(a).—SMALL, BROWNISH AND BRISTLY LARVA.

Stage 2.—Length, 2 to 2½ mm. Brownish or blackish. Five pairs of prolegs on segments 7 to 10 and 13. Head distinct, chitinous, shining polished black ; dorsum of prothorax also chitinous, emarginate behind, blackish. Rest of larva brownish, each segment with twelve circular dot-like raised blackish papillæ in an irregular transverse row, each papilla bearing a black hair. Rows on thoracic segments straighter. Head and prothorax also hairy. It is barely to be perceived that the whole integument is covered with microscopically short, bristly pubescence. Ten specimens.

Stage 3.—Length, 3 to 4 mm. Head black, variegated with brownish, or wholly very light, even pale-yellowish. Proscutum black. Ground colour of larva about same as in preceding stage ; tubercles a little more conical in form, black. The spiracles must not be mistaken for tubercles, the former being smaller and showing on most of the segments in all the stages. Microscopic bristly pubescence of integument slightly more evident. Seventeen specimens.

Stage 4.—Length, 5 to 5½ mm. Head usually very light, with four faintly mottled areas of brownish ; prothorax rather light, but oftener of the brown colour of rest of body. Tubercles more strikingly conical. The integument shows very plainly the short, stubby, whitish and brownish bristles, usually in longitudinal whitish and brownish rows. Nine specimens.

Stage 5.—Length, 5½ to 7 mm. Head large, very pale-yellowish, only three of the mottled faint brownish areas, the one near oral margin being more or less obsolete. Black tubercles or papillæ very conical ; hairs longer and stouter, the larva therefore appearing somewhat more bristly. The stubby, bristly growth of integument is very apparent in its narrow, longitudinal, alternating white and brown rows. Eight specimens.

Stage 6.—Length, 7½ to 9 mm. Head about same as preceding stage. Prothorax darker. The white longitudinal rows of stubby bristles showing most plainly in the median region, and on each side. Five specimens.

Stage 7.—Length, 9½ to 10 mm. Larger, brownish in general colour, broadly whitish laterally on sides, and the stubby bristles of integument showing very plainly, the white rows mostly on median region. Three specimens.

The above stages have been separated solely by examination, but are probably approximately correct. Described from alcoholic specimens, swept from alfalfa May 28, 1891. Specimens of the same larva, from 3 to 7 mm. long, had been previously swept from alfalfa, May 9 to 12. General colour noted in life. (Nos. 18, 30.)

(b).—YELLOWISH LARVA, WITH BLACK WARTS OR TUBERCLES.

Length, nearly 7 mm. Five pairs of prolegs, on usual segments. Hardly any hairs above, rather long hairs on sides and below, all these hairs directed downward. Head black, with a yellow triangular area in middle, and with yellowish oral region and antennæ. Prothorax with six black spiniferous tubercles in a transverse row, and two blackish markings on posterior border. Other thoracic segments with the same six black tubercles, and also with two similar but somewhat smaller yellowish tubercles, one on each side of the median pair of black ones. All the abdominal segments, except the anal, with the same tubercles as last two thoracic segments, but each in addition with a median anterior pair of small blackish tubercles situated between and slightly anterior to the median large pair.

One specimen, swept from alfalfa May 12, 1891. Colour noted in life. (No. 79.)

(c).—PALE GREENISH, NEARLY BARE LARVA.

Length, 8 mm. Light-greenish, inclining to brownish posteriorly, with a whitish stripe on each side of the body. Five usual pairs of prolegs. Integument bare and without hairs, except on venter. Head and feet light coloured, pale-yellowish. Methorax with a pair of black spots on dorsum, each spot just inside the lateral white stripe. Fifth (first abdominal) segment with a pair of larger black spots, one on each side just outside or below the lateral whitish stripe. Each of the lateral whitish stripes with two narrow brown lines running its whole length and more approximated to lower border. The greenish median portion has three lighter narrow longitudinal lines, one being median, and the outer ones very closely approximated to the lateral whitish stripes.

One specimen, swept May 9, 1891. Colour noted after a few days' immersion in alcohol. (No. 29.)

(d).—PALE-YELLOWISH, RATHER STOUT AND QUITE HAIRY LARVA, WITH BROWNISH STRIPES.

Length, 10 mm. Ground colour very pale-yellowish or whitish. Five usual pairs of prolegs. Head, prothorax, anal segment and whole ventral surface especially pale. A lateral rather wide stripe on each side encloses the spiracles; each section of it, corresponding to an abdominal segment (except on anal), marked by the spiracle in the centre, and extended into a sharp prolongation dorsad, ventrad and caudad (especially the first two), bearing a small dark papilla from which springs a long hair; a similar papilla below the sections bears a similar hair. Dorsum of larva with three pairs of brownish longitudinal lines, a median and two lateral ones. Between these are whitish and pale-brownish lines, the dorsal integument being covered with short, stubby bristles of these colours; and each segment with two pairs of light, smooth and naked tubercles, each bearing a rather long hair, the anterior pair of tubercles more approximated to each other than the hind pair. The head and prothorax also bear hairs.

One specimen, swept May 28th, 1891. (No. 228)

(e).—GREEN LARVA, WITH A WHITISH LINE ALONG EACH SIDE OF BODY.

Length, 14 mm. Venter light. Usual five pairs of prolegs. Whole surface of body, both above and below, evenly and quite thickly clothed with fine, short hairs. Head concolorous, similarly clothed with hairs. Hairs arising each from a small, black, dot-like tubercle, which occupies the centre of a circular naked areole, the rest of the epidermis being covered with microscopic black spines which appear only as closely approximated minute specks under a high power lens. These areoles are particularly distinct on dorsal regions, somewhat less so on sides of venter, the median ventral region and head not showing the microscopic epidermal specks. The dots from which the hairs arise are also absent on median ventral region. The principal segments show five transverse wrinkles or folds above, dividing the dorsum of the segment into six transverse sections; each section usually bears a row of areoles, though some have additional ones irregularly interspersed, which are usually smaller. These transverse wrinkles stop at the whitish lateral line on each side, which defines the lateral edge of dorsum.

One specimen, swept May 12, 1891. Colour noted in life. (No. 78.)

(f).—GREEN LARVA SIMILAR TO PRECEDING.

Length, about 23 mm. This exactly resembles the preceding *(e)*, except in one or two details, which may indicate its distinctness, or may

indicate only a greater number of moults. If it is not the same, it is a very closely allied species. Colour is green, with two lateral longitudinal narrow whitish stripes, one marking the lateral edge of dorsum on each side and enclosing the spiracles, and in addition a median dorsal pair of similar stripes. Head is lighter than dorsum, approaching more nearly the colour of the stripes; venter light. The same microscopic black epidermal specks or spines are present, and the same naked areoles with dot-like tubercles in the centre, but the portion of the integument covered by the dorsal stripes has lost both apparently. These are shown, however, to be lost only in colour, the microscopic spines being apparent in the stripes where the integument is transversely folded, but they are concolorous instead of black. Their colour is also nearly lost on anal segment. Dot-like hair tubercles of head brown.

One specimen, swept Oct. 24, 1892. General colour noted in life. (No. 365.)

(g).—VERY SLENDER AND ELONGATED BROWNISH SPAN-WORM.

Length, 9 mm. Two pairs of proportionally large prolegs, on segments 12 and 13. Colour brownish, with a somewhat lighter ventral line, and a pale lateral stripe or line on each side. Head, prothoracic segment and anal extremity light. Abdominal segments very elongated, almost bare, with some sparse minute tubercles giving rise to hairs. The main abdominal segments are more noticeable for being divided by minute transverse constrictions or wrinkles extending completely around the body into something like thirty or more transverse sections to the segment.

One specimen, swept May 28, 1891. Colour from alcoholic specimen. (No. 229.)

(h).—PALE COLOURED FALSE SPAN-WORM.

Length, 4 mm. Three pairs of prolegs, on segments 9, 10 and 13. Light or pale coloured, with small brownish warts and hairs. Somewhat elongate, and rather slender. Segments not elongate. Head nearly concolorous, slightly more yellowish and polished. About twelve small, flattened-conical tubercles to each abdominal segment, each tubercle bearing a hair, and some smaller ones on ventral surface below. Tubercles in an irregular transverse row. Except the tubercles, the integument is apparently naked under the lens.

One specimen, swept May 28, 1891. Colour noted in life. (No. 230.)

(i).—LIGHT GREEN FALSE SPAN-WORM.

Length, 7 to 8 mm. Three pairs of prolegs, on segments 9, 10 and 13. Elongate and rather slim, light green in colour. Segments not longer than wide; with but very few short hairs, each arising from a minute pale brownish dot in centre of a rather indistinct tubercle, a dozen or so to each principal segment. Head likewise with hairs, which arise from less plain dots. In addition to these, there is on each side of segments 5 to 11 a conspicuous black tubercle bearing a hair, these tubercles being of same form as the others, but appearing much more conspicuous and larger because of the black pigment they possess.

Two specimens, swept May 12, 1891. (No. 80.)

NOTE.—The measurements given above were made from the alcoholic specimens, and are somewhat (usually a millimeter or so) less than what the same specimens measured in life.

CORRESPONDENCE.

REARING SPHINX CHRYSALIDS.

Sir: On the 30th of July, 1892, I saw a Sphinx larva digging into the ground at the foot of an ash tree, evidently with the intention of burying itself preparatory to transforming. I put it into a box I had in my satchel, and forgot it until three days after. When I opened the box there was a perfectly formed chrysalid instead. I placed it on the same bed that the *Quinquemaculata* of my former record had matured upon (CAN. ENT., Vol. 24, p. 237), and paid no further attention to it. On the 20th of June, 1893, that chrysalid gave forth a *Sphinx chersis*, Hub., large in size, perfect in form and rich in colouring. This surely proves that moisture is not an absolute necessity for the maturing of Sphinx pupæ, of these kinds at least.

In my earlier efforts to obtain moths from Sphinx pupæ I had no success. Being under the impression that moist soil was necessary for their maturing, all the careful attention I could give them was unavailing; they invariably died. Observing that soil getting between the segments of the abdomen irritated them greatly, and kept them constantly wriggling, I got some growing moss, put it on a plate, placed the chrysalids on it, moistening it slightly, when all my troubles with them disappeared,—no more moulding or drying up, they matured without fail, and the moths emerged in perfect condition. This simple method was to me a most gratifying success. I could now obtain the moths with no special attention required for the chrysalids.

In nature, the larva makes a cavity in the soil to transform in, pressing the soil firm and making the inside of the cavity as smooth as that of a silken cocoon. So that the pupa lies perfectly free, which will account for the fact that when placed in soil they always work themselves to the surface. Freedom from irritating matter is then, I suspect, one of the principal factors for successful maturing of them. And to those that have passed the winter in natural conditions, moisture may be another, but those that have begun their pupal existence in unnatural conditions do not seem to feel the need of it.

We know that it is comparatively an easy thing to get the pupa from a sphinx larva, besides getting the imago from the pupa; if, then, such pupæ can be matured without the labour and care required to get up and maintain "natural conditions," with the probability of a disappointing failure at the end of it all, what an inducement it would offer to many to undertake the rearing of them who are now prevented from attempting it by the elaborate preparations that seem required to ensure success. Whilst, if safety and a soft bed is all that is required for success, many a valuable chrysalid that is now rejected or neglected, under the impression that it would be hopeless to attempt to rear it with the means they have on hand, might be reared to add rare forms to a collection, or even to aid in the identification of earlier stages of some of the species. An experiment on an extensive scale in this direction is well worth the making.

J. Alston Moffat.

BOOK NOTICE.

BRIEF GUIDE TO THE COMMONER BUTTERFLIES OF THE NORTHERN UNITED STATES AND CANADA: by S. H. Scudder. Henry Holt & Co., 12mo., pp., XI + 206., 1893.

It has been known for some time that Mr. Scudder has in preparation a Manual of the Butterflies of the Northern United States and Canada, similar to Gray's Manual of Plants, and all must agree that such a work is much needed. The present "Brief Guide" has, however, been produced in the meantime to meet a demand for something even less technical, by means of which boys and girls might be tempted to enter the ever charming fairy-land of science by having an easy way laid open before them. There are few objects in nature which so soon thrust

themselves upon the notice of young people as flowers and insects, and of these none have been so useful as a first stepping-stone or allurement to the realms of Natural History as butterflies,—" those winged creatures of beauty which add such a charm to the summer landscape."

There was not, however, until now any work which could be placed in the hands of boys or girls who had caught a common butterfly, by means of which they could identify and find out something of the life-history of their newly-found treasure. This want Mr. Scudder has filled with his Brief Guide, in which he treats chiefly of " those butterflies—less than a hundred of them—which would almost surely be met with by any industrious collector in the course of a year's or two years' work in the more populous Northern States and in Canada." Should a young collector, therefore, be lucky enough to capture a butterfly not mentioned in the book, he may be sure that he has taken a rarity, which, as the author remarks, is " a discovery not always distressing to the amateur." The introductory chapters, upon some of the points which will at once present themselves to a beginner, are excellent—concise, clearly expressed and accurate, and treat of such subjects as :—What are butterflies? their structure, habits, variations, and life-histories. There are three keys for identification, based on the perfect insect, the caterpillar and the egg, and pages 63 to 174 are taken up with short accounts, systematically arranged, of the insects treated of. There is a short glossary and an appendix giving instructions for collecting, rearing and studying butterflies.

On the whole this is a very useful little work, well prepared, convenient in size, well printed and well got up. It is, of course, arranged after the same system as Mr. Scudder's great work, " The Butterflies of the Eastern United States and Canada," and many of the views there expressed are repeated here. The nomenclature is also the same, but the names more frequently used by other authors are also given. A good feature of the work is that the proper pronunciation of every name is shown by accents, and a popular English name is given for each species. The author's observations on dimorphism of some species, as of *Colias Eurytheme* and *Papilio Ajax*, do not seem quite to agree with those published by Mr. W. H. Edwards. It would be difficult, however, to treat such subjects fully in the space allotted to each species in this Brief Guide, which, we think, all who use it will agree is too brief, and they would like much more of it, of the same style.—J. F.

Mailed September 9th.

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WASHINGTON TENTHREDINIDÆ AND UROCERIDÆ.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The specimens on which the present paper has been based were collected by Mr. Trevor Kincaid, of Olympia, Washington. They were all collected near that city except a few, which were taken along the Skokomish River. Great credit is due Mr. Kincaid for bringing together so large a collection. The specimens are deposited in the entomological collection of Cornell University.

TENTHREDINIDÆ.

Trichiosoma † *triangulum*, Kirby.

3 ♂ ♂, June 6, 22, 23, 1892. They agree perfectly with Norton's description of this species, except the apical segments of the antennæ, which are entirely black.

Zarca americana, Cress.

2 ♀ ♀, April 17 and May 23, 1892.

Hylotoma abdominalis, Leach.

1 ♀, May 3, 1892. Skokomish River.

Hylotoma Macleayi, Leach.

1 ♀, May 11, 1892.

Euura abbiricta, Cress.

1 ♀, Skokomish River, May 8, 1892.

Nematus castaneus, Kirby.

A single female, which in all probability belongs to this species, has two broad black bands on the lateral lobes of the mesothorax and two less distinct bands on the median lobe; the square spot on the vertex is fuscous, a small spot between the antennæ and the base of the sinus from

† The following is omitted from Cresson's synopsis. It will probably prove to be a variety of *triangulum* and not the European species.

vitellina, Linn.

1882. *Trichiosoma*, Kirby, List Hymen., Brit. Mus., I., 10.

Habitat. Vancouver's Island, Rocky Mountains, (Europe).

above the antennæ to the clypeus is black; the clypeus is distinctly emarginate, and just beyond the middle of the second submarginal cell there is a small fuscous speck.

Nematus luteolus, Nort.

Two males, which I think belong here, have a broad margin to the abdominal segments; the margin is broadest on the middle segments, almost interruptedly transversely fasciate, the apex of the abdomen and the entire venter honey-yellow.

Nematus, Sp.

There are six species in the collection which are probably new; in the present state of the genus it seems best to leave them undescribed.

Messa atra, sp. nov.

Head, labium, mandibles, antennæ, thorax, abdomen, coxæ except at apex, and femora at middle, black; clypeus acutely emarginate, labium broadly rounded; head and thorax sericeous; middle mesothoracic lobe with a central groove on its anterior half; abdomen black, apical segment above slightly rufous; coxæ black, at apex fuscous; femora at base and apex white, with a broad median black band; anterior and middle tibiæ fuscous, darker beneath, hind tibia black, at base white; spurs fuscous; anterior and middle tarsi at base fuscous, apex black, hind tarsi black; wings hyaline, veins piceous, stigma lighter at base. Length, 7 mm.

1 ♀, April 14, 1892. Related to *salicis*, Ashm., but differs by its rounded labium and black abdomen.

Dolerus borealis, sp. nov.

Body stout, black, except the two lateral lobes of the mesothorax, which are reddish-brown; head, thorax and pleuræ densely coarsely punctured; antennæ slender, third and fourth joints subequal; clypeus deeply emarginate; two feeble longitudinal sinuses on the vertex each side of the ocelli; body densely sericeous, especially around the mouth and on the legs; inner tooth of claw stout, distinct; wings slightly fuscous, veins, costa and stigma black. Length, 11 mm.

2 ♀ ♀, May 22, 1892.

Dolerus sericeus, Say.

3 ♀ ♀, May 11, June 6, 1892, and April 20, 1893. This last specimen measures 12 mm., and the wings are clearer than in typical specimens, but otherwise I can find no distinguishing character.

Blennocampa atrata, sp. nov.

Shining black; antennæ as long as head and thorax, third joint more than twice as long as fourth; clypeus truncated, labium small, triangular; femora at apex, front and middle tibia before, hind tibia, except at apex, and basal membrane, smoky white; wings transparent, slightly washed with yellowish, veins, costa and stigma black, transverse marginal nervure received a little beyond the middle of the third submarginal cell. Length, 7 mm.

1 ♀, May 7, 1893.

Monophadnus atracornus, sp. nov.

Shining black, impunctate; head entirely black, apex of clypeus slightly emarginate; antennæ as long as head and thorax, third joint one-third longer than fourth; tegulæ, apex of all the femora, the tibiæ and front and middle tarsi, except at apex, white; apex of all the tibiæ, the apex of the front and middle tarsi and the whole of the hind tarsi, infuscated or black; wings hyaline, slightly smoky, iridescent, costa and stigma brownish; transverse marginal nervure bowed, received near the apex of the third submarginal cell. Length, 7 mm.

2 ♀ ♀, May 18, 1892; April 30, 1893. Most closely allied to *M. tiliæ*, Nort.

Hoplocampa pallipes, sp. nov.

Head ferruginous; antennæ, small square spot between antennæ, apex of mandibles, spot at ocelli, black; clypeus emarginate, labrum rounded; antennæ not pilose or hairy; thorax light ferruginous, prothorax and collar narrowly margined with black, tegulæ and pleuræ testaceous; abdomen short, broad, broadest at middle; the basal plates, the venter, a narrow lateral margin, and the three apical segments ferruginous, the remainder of the dorsum black, in one specimen the basal plates are black; legs entirely ferruginous, sericeous; wings hyaline, veins luteous. Length, 5 mm.

3 ♀ ♀, Skokomish River, May 8th.

Monostegia Kincaidii, sp. nov.

Head, antennæ, labium and mandibles black; face sericeous; antennæ reaching to base of thorax, flattened, third joint scarcely longer than fourth; clypeus slightly emarginate; thorax black, prothorax narrowly margined with white; abdominal segments one to five with basal whitish bands, broadly interrupted at middle, segments three to six very narrowly tipped with white; legs black, apex of anterior femora

and tibia beneath white, middle and posterior tibiæ densely sericeous: wings hyaline, slightly obscure, veins black, costa and stigma brownish, first branchial and second submarginal cells with a black dot. Length, 7 mm.

1 ♂, 7 ♀ ♀, April 17, 1892, on the catkins of *Salix flavescens*, and May 7th, 1893. Two specimens with the venation of *Harpiphorus* probably belong here.

Labidia opimus, Cress.

1 ♂, June 25, 1892.

Macrophya californica, Nort.

Three females, two from the Skokomish River, May 5th, on *Ribes bracteosum*. These specimens do not agree perfectly with Norton's description, but they differ more among themselves than from the description. The interrupted band on the abdomen and the black spot on the hind coxæ are wanting, in one specimen the abdomen is reddish-brown, and the antennæ, except the basal segment, entirely black.

Macrophya oregona, Cress.

1 ♀.—Differs from Cresson's description only in having a small white spot on basal plates.

Macrophya marginata, sp. nov.

Black; labrum, clypeus, mandibles, except at tip, palpi, cheeks, an elongate spot on inner orbits above the antennæ, spot beneath the antennæ, the orbits above the base of the antennæ, tegulæ, a broad band on coxæ, all interrupted at middle, a large spot on each thoracic pleura, the scutellum, lines on the sides of the thorax and at the base of the wings, [illegible] a band extending along the edge of [illegible] to the apex of the seventh segment, [illegible] white; antennæ, sternum, [illegible] head, black; the [illegible] and the saw reddish-brown; the [illegible] the third as long as the [illegible] veins black, the costa [illegible] cell and a straight cross nervure. [illegible]

[illegible] 1892.

Strongylogaster pacificus, sp. nov.

Female.—Black; head and pleuræ covered with a dense sericeous pile; third and fourth antennal joints subequal; sinus at sides of ocelli almost reaching the back of the head; head and thorax remotely and coarsely punctured, the palpi, the tegulæ, the front angles of the thorax, the coxæ except at base, the trochanters, the front femora, the apical half of the middle and hind femora, the front and middle tibiæ, the basal half and apex of the hind tibia, and the front and middle tarsi, white; abdomen, except the basal plates and the first segment, which are black, honey-yellow; apex of the abdomen with a whorl of black hairs, concealing the saw, the venter honey-yellow, with a narrow black band along each side; wings transparent, their base and the costa yellow, the stigma brown, its lower edge lighter, lanceolate cell without oblique cross-vein, hind wings with two middle cells. Length, 6–8 mm.

Var.—Black markings of the legs less distinct, dorsal abdominal segments 3–5 with a small fuscous spot at middle, segments 6–9 with a transverse black band, covering almost the entire segment, apex black.

Male.—Does not differ except in wanting the whorl of hairs at the apex of the abdomen and in having all the legs white.

14 ♂ ♂, 3 ♀ ♀, May 18–22, 1892; April 30, May 7, 1893; a single male from the Skokomish River.

Strongylogaster primativus, sp. nov.

Female.—Black, antennæ short, third and fourth joints subequal; clypeus and labrum dirty white; head sparsely punctured, thorax impunctate; the tegulæ, the front angles of the thorax the coxæ except at base, the trochanters, the apex of the femora, the front and middle tibiæ (in some specimens slightly clouded), the base of the posterior tibia, and the base of the front and middle tarsi, waxen white; abdomen black, venter and pectus black, the venter margined each side with a yellow band, in some specimens these bands coalesce on the venter and form a narrow margin on the dorsum; wings hyaline, yellowish at base, veins black, the apex of the costa and stigma black, lanceolate cell open, with a perpendicular cross-nervure, in some wings the cross-vein is represented only by points on the longitudinal veins, hind wings with two middle cells. Length, 9 mm.

Male.—Smaller, not so robust, legs whitish-yellow, except the posterior tibiæ and tarsi, which are fuscous; a narrow margin to abdominal segments 2-5, and the apex of the abdomen yellow.

1 ♂ and 15 ♀ ♀, April 20 and May 19-23.

Tenthredo Barnstonii, Kirby.

1 ♂, poor condition; the legs are entirely ferruginous, the hind legs are darker than the anterior ones.

Tenthredo nigricostata, Prov.

1 ♀, July 22, 1892. This is probably the same as *erythromera*, Prov.

Tenthredo xanthus, Nort.

1 ♀, May 21st. The light spot above the coxæ and the black lines on the tergum are wanting. There is a black dot above the base of the antennæ.

Tenthredo scaevola, Cress.

2 ♀ ♀, May 7, 1893.

Tenthredopsis transversa, sp. nov.

Black; clypeus white; palpi, tegulæ, collar, narrow elongated spot from tegulæ, apices of the coxæ, the femora, except a black line above, the front and middle tibiæ, a line on the hind tibia beneath, the front and middle tarsi beneath, the venter, a narrow margin to abdominal segments 2–5, and the apex of the abdomen, yellow; the basal membrane and very narrow margin to abdominal segments 6–8, white; the clypeus slightly emarginate, the vertex finely punctured; the thorax impunctate; antennæ long, slender, black, segments 3–5 equal; wings transparent, veins black, costa and stigma lighter at base; hind wings with two distinct middle cells. Length, 8 mm.

2 ♂ ♂, May 18, 1892; May 7, 1893.

Tenthredopsis ruficorna, sp. nov.

Black; the clypeus, the labrum, the mandibles, except at tip, a spot between the antennæ, two spots above the antennæ, the cheeks, a broad postocular band, an interocular band, broader from opposite antennæ below, continued narrowly to the postocular band, the prothorax, tegulæ, a spot below the tegulæ, a trapezoidal spot on pleuræ, a spot above posterior coxæ, a slender line above this spot, front and middle coxæ, and posterior coxæ, except two longitudinal black lines, waxen white; antennæ, except two basal joints, black, honey-yellow above; cenchri, abdomen, except immediate base of basal plates, and legs, except coxæ, honey-yellow; clypeus scarcely emarginate, labrum rounded; segments 3–5 of antennæ subequal; wings yellowish-hyaline, veins fuscous, costa and stigma honey-yellow; hind wings with one or two middle cells. Length, 11 mm.

1 ♀, May 22, 1892. This may prove to be a variety of *Tenthredo ruficoxa*, Prov.

Lyda olympia, sp. nov.

Ferruginous, shining; segments 10–24 of antennæ, spots at base of antennæ and narrow line between, beneath the ocelli, prothorax, metathorax above and on sides, basal plates, the sutures of the venter, and the apex of the abdomen, black; cheeks, clypeus, interior orbits and between the antennæ, yellowish; antennæ twenty-four-jointed, first and third segments subequal, third segment three times as long as fourth; posterior femora infuscated at base, otherwise the legs entirely ferruginous; front tibia with a single side spur; wings yellowish-hyaline, veins yellowish, stigma darker at base, third submarginal cell broader and slightly longer than second, second branchial cell without cross-nervure; hind wings with apparently tnree closed cells. Length, 14 mm.

1 ♂, June 11, 1892. This may be *bucephala*, Cress.

UROCERIDÆ.

Oryssus occidentalis, Cress.

1 ♀, the head is wanting, but the specimen without much doubt belongs to this species. The two basal abdominal segments are black.

Urocerus albicornis, Fabr.

1 Female.

Urocerus apicalis, Kirby.

1 ♂. The last dorsal abdominal segment is flattened.

Urocerus Behrensii, Cres.

1 ♀, probably belongs here, the wings are entirely fuscous, the apex of the antennæ and all the tarsi are yellow.

Urocerus flavipennis, Kirby.

3 ♀ ♀. One from the Skokomish River, Aug. 7. Only one specimen has the spots on the side of the abdomen, another has the antennæ entirely yellow.

Urocerus indecisus, sp. nov.

Antennæ, head, thorax, basal plates, first and apex of the last abdominal segment, a band each side below, and all the legs except the two apical segments of the tarsi, black; the remainder of the abdomen and tarsi brown; antennæ twenty-two-jointed; wings slightly fuscous, the veins black, the second transverse cubital vein with a stump of a vein on the inner side; cornus long, suddenly narrowed at apex, apex with several teeth. Length, 16 mm.; alar expanse, 26 mm. 1 ♂.

Urocerus riparius, sp. nov.

Black; clypeus, labrum, mandibles except at tip, spot behind the eye, joints 3-9 of the antennæ, prothorax, apex of the front and middle femora, their tibiæ and tarsi, the base of the hind tibia and metatarsus, the two apical segments of their tarsi, and abdominal segments three to six, yellow; antennæ twenty one-jointed, the yellow band on the antennæ is clouded with fuscous and varies in width; wings yellow, slightly clouded, veins black. Length, 22 mm.; alar expanse, 33 mm. Two males, one from Skokomish River, May 3.

DESCRIPTIONS OF THE LARVÆ OF CERTAIN TENTHREDINIDÆ.

BY HARRISON G. DYAR, NEW YORK.

Hemichroa americana, Provancher.

(The alder saw-fly).

Described as a Dineura, but the lanceolate cell is contracted in the middle, not petiolate. The second recurrent nervure is received very near the end of the second submarginal cell, almost at the intersection of second and third submarginal cells.

♂.—Shining black, the legs brownish-yellow, all the coxæ, the apical third of posterior tibiæ and posterior tarsi black. Wings smoky, but pale along the outer margin. Nervures and stigma black.

♀.—Head and body yellowish brown; antennæ, eyes, metathorax and legs as in the ♂. Bases of all the femora more or less black. Black markings somewhat variable.

A smoky spot in the centre of the second submarginal cell in both sexes.

15 [illegible]. Bred from larvæ on *Alnus serrulata*, at Woods' Holl, Mass., and Keeseville, N. Y.

Egg.—Laid in slits made from below on the petiole and base of midrib of a leaf. Eggs placed in one or two rows, along one or both sides of the rib, nearly contiguous.

First stage.—Eating a little hole or slit through the leaf. Head rounded, higher than wide, [illegible] ocelli, eyes black; width, 0.3 mm. Body curved into an S shape out of the hole in the leaf, through which the larva readily moves. Thoracic legs honey yellow, annulate, [illegible] shining, the alimentary canal gives a greenish tinge by trans-

Second stage.—Much as before. Width of head, 0.4 mm. Body rather dark honey-yellow, greenish tinged. Two transverse rows of subconical tubercles are seen on each segment, bearing minute setæ which are blackish.

Third stage.—Head brown, shining, eye black, mouth dark; width, 0.55 mm. Body greenish-yellow, rather sordid and only slightly shining. Thoracic feet slightly marked with black and traces of lateral and broken substigmatal black lines appear, most distinct centrally. Setiferous tubercles blackish.

Fourth stage.—Head minutely pilose, blackish-brown, eye black; width, 0.75 mm. Thoracic feet pale. Body marked as in the next stage, but the tubercles are larger in proportion, and the subventral black patches are rounder and more evidently cover the anterior and posterior patches of tubercles.

Fifth stage.—Head brownish-black; width, 1.0 mm. Practically as in the next stage. The body tubercles are tinged with brownish.

Sixth stage.—Head well-rounded, slightly acute at vertex, not conspicuously flattened before; shining black, sparsely pilose; width, 1.4 mm. (or as large as 1.7 mm. in some ♀ ♀). Thoracic feet spreading, black, pale at the joints. Abdominal feet present on joints 6–12 and 13 posteriorly (22 feet). Body smooth, subannulate or creased, not shining. colour subtranslucent greenish-ochre, with an even, continuous, black lateral line, and a geminate interrupted subventral one. Two transverse rows of smooth, inconspicuous, concolorous, setiferous tubercles on each segment, of moderate size and arranged subventrally in the black patches in clusters. Venter pale. Joints 2 and 13 posteriorly of a darker ochre. The larvæ rest on the edge of a leaf, and lash the posterior part of their bodies vigorously when disturbed, holding on to the leaf by the thoracic feet.

Seventh stage.—The larvæ do not feed in this stage, but enter the ground soon after moulting. Head as before, its width the same (1.4-1.7 mm.) Body much the same, but smooth. The tubercles are represented by elliptical watery areas in three rows on each segment, with rudimentary setæ. The colour is a rather opaque yellow, with no shade from the alimentary canal. The black marks are the same.

Cocoon.—Formed beneath the ground; thin, crusty and brittle; elliptical and of uniform texture, brown in colour. Size, 8x4 mm.

Pupa.—Much like the mature insect, but with rudimentary wings. All brownish-yellow, the legs, cases and antennæ darker, eyes blackish.

The flies emerged in August.

Cræsus latitarsus, Norton.

(The white birch saw-fly.)

Eggs.—Laid closely along the midrib or larger veins on the under side of the leaf, about half enclosed in median saw-cuts which are distended by the eggs so that they lie obliquely in contact. Soft, translucent white; seen to be very minutely punctured under a magnification of 60 diameters. Size, 1.4x.6 mm.

First stage.—Eating holes through the leaf, which soon become confluent; lashing the body. Head round, a little higher than wide, full at vertex; shining black; width, 0.4 mm. Body light shining greenish. Tubercles very obscure, not setiferous, only the subventral ones distinct and nearly concolorous. Thoracic feet blackish; the segments of body obscurely annulate.

Second stage.—Head very smooth, even brownish-black, pale above the mouth; width, 0.55 mm. Body olive-green, the subventral ridge and feet blackish. No setæ seen.

Third stage.—Head black; width, 0.75 mm. Much the same.

Fourth stage.—Head, 1.05 mm. wide. Markings much as before.

Fifth stage.—Head round, full at vertex, well rounded, not pointed, without trace of sutures; flattened in front over clypeus, with a few slight clypeal dents. Entirely shining black; width, 1.6 mm. Body indistinctly 4-annulate, watery shining smooth; no dots, but minute black setæ represent them. Thoracic feet large, spreading, black, pale centrally. Abdominal feet present on joints 6-11 and 13 (20 feet), with a medio-ventral eversible gland, posterior to each pair on joints 6–10. These glands are longer than the feet, when everted, are coloured rather darker than the body. When disturbed the larva throws its body up over its head and the ventral glands are quickly everted and retracted. Ground colour honey-yellow heavily shaded with greenish black, the yellow appearing on joint 2 anteriorly, stigmatally and on the abdominal feet.

Sixth stage.—Width of head, 2.2 mm. As before, but smooth; no setæ seen. Joint 2, the dorsal and stigmatal irregular bands and abdominal feet honey-yellow, leaving the black shading most distinct subdorsally

and substigmatally, forming a series of very black subdorsal patches or spreading largely over the body. At the end of this stage the larva enters the earth without moulting.

Cocoon.—Formed beneath the ground; elliptical, rather thick, firm, opaque, black. Size, 11 x 4.5 mm. Imagos appeared August 1. Larvæ found on the leaves of *Betula populifolia* at Woods' Holl., Mass., and Plattsburgh, N. Y.

Fenusa varipes, St. F.

(The imported alder leaf-miner.)

Abundant on *Alnus serrulata* at Woods' Holl., Mass., causing the leaves to turn brown and fall.

Egg.—A slight circular swelling in the leaf, visible on both surfaces. 0.5 in diameter. The egg is thin, delicate, milky white, about 0.3 mm in diameter, inserted under the epidermis by a saw cut.

First stage.—Mines under the upper epidermis usually less than 1 mm. in diameter, rarely as large as 1.5 mm., starting from the egg puncture. Head much flattened, broader than long, mouth parts projecting, the lateral lobes bulging, pale watery brownish; width, 0.25 mm. Body flattened, deeply incised, joint 2 wide, joints 3–4 rapidly tapering, the rest of even width, joint 13 rounded. Feet imperceptible with a lens. Colour translucent watery, scarcely whitish, alimentary canal green. Length, 1 mm.

Second stage.—Like the preceding stage, but thoracic segments larger and body more deeply incised. Milky translucent, the alimentary canal green, head brownish, 0.3 mm. wide. Feet very rudimentary, but visible. Cervical shield present, large, not very distinct. Burrow about 3 mm. diameter.

Third stage.—As before. Width of head, 0.4 mm.; diameter of burrow, about 6 mm.

Fourth stage.—Much as in the next stage. Cervical shield covering the anterior half of joint 2, very faintly brownish, as are the thoracic feet. Head rather paler than in the next stage, 0.55 mm. wide. Burrow about 10–12 mm. in diameter.

Fifth stage.—Head much flattened, mouth projecting in front, clypeus occupying the central third of what is the upper surface; lobes rounded, projecting laterally; ocellus nearly central. Colour honey-brown, paler, almost whitish toward vertex, which is withdrawn beneath joint 2; mouth dark brown, eye black; width, 0.75 mm. Abdominal feet very rudi-

mentary, present on joints 5-12 (none on joint 13). Thoracic feet small, almost lateral, indistinctly jointed, faintly brownish, not used. Body flattened, rounded, of nearly even width, segmental incisures distinct and broad, segments faintly 3-annulate. Colour shining whitish, subtranslucent, the alimentary canal green. No anal plate, but a very large, bisected, brownish cervical shield. No tubercles nor setæ distinguishable. Burrows large, spreading from 28-35 × 14-9 mm., often becoming confluent with others over the whole leaf, transforming the upper surface into one continuous brown blister.

Sixth stage.—On attaining this stage the larvæ burst through the upper epidermis and fall to the ground, eating nothing after the moult. Head slightly darker than body, shining, mouth brown, eye dark brown; width, 0.75 mm. Body shining pale yellowish-white, with no discolorous shade from the alimentary canal. On joints 5-12 two watery transverse areas on each segment, the anterior composed of two dorsal dots, the posterior of two elongate pyriform subdorsal patches, slightly elevated and connected over the dorsum. Feet concolorous. Length, about 5.5 mm.

Pupa.—Formed in an elliptical cell in the ground; entirely pale yellowish, the eyes brown-black.

(TO BE CONTINUED.)

DESCRIPTION OF THE PREPARATORY STAGES OF NEMEOPHILA SCUDDERI, PACK.

BY H. H. LYMAN, MONTREAL.

Eggs laid July 9-10. Round, considerably flattened at base, honey-yellow, shining, under a microscope very slightly and irregularly pitted, $\frac{1}{18}$ of an inch in diameter.

Hatched July 17-18, egg period eight days.

Young larva.—Length, about one-tenth of an inch. Head brown, rather lighter below. Body, dull greenish-yellow, with lead coloured warts and long hairs of a brown colour.

I failed to observe the first moult, but the following description was taken on August 16th, just before what I believed to be the second moult. Length, $\frac{7}{16}$ to $\frac{3}{8}$ inch. Head small, slightly and obtusely bilobed, black and shining, with a few hairs about mouth parts.

Body above generally dark, but occasionally rather light in colour, with 10 or 12 warts on each segment. These warts are round, black and

shining, clothed with dense tufts of black hairs, mixed with reddish-brown ones on the top of the 5th to the 9th segments. Below greenish-black, feet and prop-legs concolorous and semi-transparent.

After second moult.—Length, 3/8 to 7/16 inch. Same as before, except that the skin is blacker and there are some rather long tufts or pencils of hair on the hind segments, and there is a patch of foxy hair on the top of the 5th, 6th and 7th segments. Feet black.

After third moult.—Length, 5/8 to 11/16 inch. Head black, slightly and obtusely bilobed.

Body black, the warts, 10 or 12 on each segment, are black and shining, and arranged in a transverse row of 10, with two in front of the general line in the middle, thus . . . . . The warts are furnished with radiating tufts of bristles, which are either black, foxy-red or yellowish, according to their position. Those on the top of the 5th, 6th and 7th segments are foxy-red, and those on the two lowest lateral rows of warts and the lower hairs of the third row are of a yellowish-brown colour. The rest of the hairs are black, and those towards the anal extremity are rather longer than the others. Feet black, prop-legs dark, with a small wart, with a few short bristles on the outside of each; segments without prop-legs have small warts underneath.

Passing 4th moult September 6th.—

After fourth moult.—Length at rest, 3/4 inch; in motion, 7/8 inch. Colours the same as before, but with more foxy-red, which now extends from the 5th to 9th segments inclusive, and is not confined to the top, but extends down to meet the lighter coloured hairs along the sides, so that the black hairs are confined to the upper part of the 2nd to 4th and 10th to 13th segments, and a few along the sub-dorsal region on the 7th to 9th segments.

Began spinning up about 14th September. A very slight cocoon is made by drawing together leaves or frass with a few threads, and some of the hairs from the body woven in. In this the caterpillar lies sluggishly for several days before casting its skin and becoming a pupa.

Pupa.—Length, 1/2 to 5/8 inch, rounded head and pointed tail, dark brown in colour.

So slight were the cocoons that nearly all the pupæ slipped out of them.

Though most of the larvæ went on to pupation, a few seemed determined to hibernate full grown, and so were placed in a box in an outhouse, but did not survive.

On 9th October I left home for a few days, but before doing so placed the pupæ in the cellar, as I did not expect the imagos to emerge till spring; but on examining the cage on 22nd October, after my return, I found that two or three had emerged in a crippled condition. I thought this might be caused by the dryness of the house, so tried to moisten the air by putting a wet sponge in the cage and in other ways, but they still continued to emerge crippled, and some only partially emerged.

On the 29th October I found one which had emerged, but the right wing cover was still adhering to the wing. I removed it with difficulty, many of the scales coming off with it, but none of the wings developed at all.

Mr. Winn suggested that perhaps the trouble arose from the absence of the cocoon, slight as it is, and I therefore tried the experiment of placing the pupæ in empty cocoons of *Halesidota caryæ*. This seemed to improve matters, and I succeeded in getting a few perfect specimens. One perfect female emerged and was left in the cage with two males for two days, in the hope of securing another lot of eggs, a large box of plantain having been brought into the house for feeding purposes. I was unable to watch these specimens, but as I did not suppose that a virgin female could pass two days with two males without being impregnated, I put the males in a cyanide bottle and the female in a pill box. A supply of eggs was secured, but they proved to be sterile.

About a dozen of the pupæ enveloped in the Halesidota cocoons, showing no sign of disclosing the imagos, were later placed again in the cellar in the hope and expectation of their maturing in the spring, but all were found to be dead on the return of that season. The larvæ fed readily on plantain, but were at all times very slugglish. Unlike most larvæ with which I have had anything to do, the faces were not cast in moulting in the usual manner, but remained attached to the skin.

In one case which was watched, the skin split along the side of the fore-part of the body. The larva rested for a time, and gathered strength for a further effort. The skin split further along and the larva again rested. Another effort, and the head was withdrawn, and then the caterpillar struggled out of the old skin. Immediately after the casting of the old skin the head and warts are honey-yellow, the latter with black points, and the skin is translucent, but dark in colour. The bristles are rather matted together, the tufts on top usually crossing each other, the under

surface is decidedly light. The hairs, which later became foxy-red, are then light-coloured.

This species was described as Nemeophila Selwynii, by the late Henry Edwards, in CAN. ENT., XVII., 65, but there can, I think, be no doubt that it is identical with that described in Proc. Ent. Soc., Phil., III., 113, by Dr. A. S. Packard, under the name of Plactarctia Scudderi, as follows :—

"♂.—Brownish-black. Sides of the prothorax, orange. Two whitish bands on the forewing; one lying just under the base of the median nervure, as long as the thorax; the other transverse running from just above the internal angle to the outer third of the costa. The middle of the patagia is whitish, and there are two curved narrow lines on each side of the meso-scutum. The tips of the palpi, and the ends of the femora above, and the tibiæ and tarsi are very pale yellowish-white, concolorous, with the bands on the thorax and primaries.

Secondaries entirely brownish-black, and concolorous with the forewings.

Length of body, .45; length of primaries, .65 inch."

Mr. Scudder's specimens were collected on the Saskatchewan River, but the best known locality is Nepigon, on the north shore of Lake Superior.

When I visited that place in 1890, July 9–11, in company with Mr. Fletcher, this species was just in season and fairly abundant, and I obtained over a dozen specimens in fine condition.

It is, however, a most difficult species to collect in good order, as the scales come off so easily that if two are in the cyanide bottle together, they damage each other immediately.

I do not think that the fact of so many of these larvæ passing through all their stages during the one season at all indicates a second brood under natural conditions, as their transformations were doubtless accelerated by being brought to a milder climate and kept in the house.

Last year Mr. Fletcher again visited Nepigon and secured eggs of this species and bred it to imago, and has informed me that while one specimen completed its transformations that season and gave the moth in the autumn, the rest of them hibernated when two-thirds grown on the surface of sod merely hidden beneath the leaves, close to the ground, but without any silken tent or cocoon. After awakening in the spring and before eating they measured exactly $\frac{5}{8}$ of an inch (average).

Mr. Samuel Henshaw kindly compared for me a specimen from Nepigon with the specimens in the Cambridge Museum, and found that while

the specimens varied slightly in regard to the whitish transverse band on primaries, which is a variable feature, in other respects, both colorational and structural, as far as they could be compared they did not differ.

In extenuation of the insufficiency of my notes on the earlier stages, I would say that the larvæ were carried all across the continent and back again to Montreal.

A NEW SPECIES OF OLIGOLOPHUS.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Very few Phalangids have been collected on our mountains, and so it is not surprising that a new species of a genus which in Europe lives in high altitudes should be found on Mt. Washington, New Hampshire. Early in September, 1893, Mrs. Annie T. Slosson kindly sent me several vials of arachnids from the White Mts., and among them a vial from Mt. Washington containing six specimens of a beautiful new species of Oligolophus. It differs from the other American species which have been referred to that genus in lacking spines to the femur of the palpus, thus resembling some alpine European forms.

Oligolophus montanus, nov. sp.

Length—♂, 4.5 mm.; ♀, 7. mm.; femur I., 2.5 mm.; femur II., 5. mm.; leg II., ♂, 30. mm.; ♀, 27. mm.

Cephalothorax without the median points, but with some small denticles in front of the eye-tubercle, a sublateral row each side, a few just behind the lateral pore, two or three on the margin a little further along, some at the posterior angle, one or two at the side of the eye-tubercle, a transverse row on an elevated ridge just behind the eye tubercle, and on each abdominal segment about nine denticles. All these denticles are black and arise from little white pits. The eye-tubercle is not large, canaliculate, and with two rows of about five denticles above. The palpi are clothed with short, stiff, black hairs, but no spines. The femur cylindrical, slightly curved, and enlarged at tip on the inner side; patella about half as long as femur, but broader and a little swollen at tip; tibia similar to patella, but a little longer; tarsus much more slender, a little curved, and about as long as tibia and patella together, claw smooth.

Legs short, the fourth pair about as long as the second, no false articulations in any of the tibiæ; metatarsus I. with two false articulations; the superior edges of coxæ I., II. and III. each bear a spine; the trochanters have some denticles on the anterior and posterior sides, the femora have about five rows of denticles; and there are two rows on

the under side of tibia I. in the ♂; the legs have many short hairs, and there are small spines at the ends of the joints.

The dorsum is dirty-white or gray, with a broad brown or blackish vase-mark. On the cephalothorax, the vase-mark covers nearly the whole surface; on the abdomen it grows narrower on the second and quite suddenly enlarging on the third segment; then gradually narrowing to the tip of the abdomen. The white or gray of the sides contains a few black spots. Venter dirty-white, with black spots; legs pale yellowish-brown; mandibles white, with a large brown spot above on the basal joint, and some smaller ones on the second joint. Femur of palpus almost wholly brown, some small spots on patella and tibia, tarsus pale.

The outline of the vase-mark from the cephalothorax to the enlargement on the abdomen is very sharp and distinct, and in the darker specimens it is bordered with white. Sometimes there is a paler stripe through the vase-mark.

Locality—Mt. Washington, New Hampshire; collected by Mrs. Annie T. Slosson.

NOTES ON A POLYMORPHIC PAPILIO.

BY WM. H. EDWARDS, COALBURGH, WEST VA.

For two or three years past Mr. David Bruce, in S. W. Colorado, has been taking *Papilio Bairdii* in company with a very different form, *P. oregonia*, as we have called it, and also with the form I described recently as *P. Hollandii*, which last is in general like *Bairdii*, but has the abdomen either with a broad stripe of yellow or almost completely yellow, instead of spotted yellow in rows, as in the *Asterias* group, and as in typical *Bairdii*. And from what Mr. Bruce has seen on the ground, he has become satisfied that all these three forms are but one species. It is a remarkable case of polymorphism, the more so that it is not confined to one sex only, and that the two main forms belong to what have been considered two different sub-groups, namely, *Bairdii* to the *Asterias* group, and this *Oregonia* to the *Zolicaon* and *Machaon* group. Of course, breeding is the final test in such a case. In 1892, Mr. Bruce obtained a large number of eggs from a ♀ of *Bairdii* confined over the food plant. This, by the way, is not one of the umbelliferæ, but of the compositæ, a strange plant for butterflies of either of these sub-groups to deposit their eggs on, *Artemisia dracunculoides*. And both these forms lay on it, passing by the umbelliferæ every time. Yet, the larvæ in confinement

have been reared on carrot, fennel and parsnip. The eggs spoken of hatched before Mr. Bruce left Colorado in September, and he brought the larvæ to his home at Brockport, N. Y., and enclosed them over a bed of growing carrots in his garden, under a wire gauze screen or box. In this way he got upwards of forty pupæ, but discovered soon that almost all had been stung by *Asterias* parasites. Out of the lot there were but three healthy pupæ, two of which produced *Bairdii* in the spring of 1893, and one a ♀ *Oregonia*, which Mr. Bruce sent me. But a few of the larvæ when half grown had been sent to Mrs. Peart, near Philadelphia, and from these she got four pupæ. These yielded in spring of 1893 one *Bairdii* and one very large and well-marked ♀ *Oregonia*, which also I now have. The other two pupæ are going over to 1894, as is often the case with the western Papilios, they running in the pupa stage for two years.

In 1893 Mr. Bruce was again upon the ground, and devoted his time largely to getting at the facts in this case. On the 23rd July he sent me two eggs of the *Oregonia*, as before, laid by a confined female. I sent one to Mrs. Peart, and she reared the larva and got a pupa 23rd August. Out of this, 8th September, came a ♂ *Bairdii*. The other egg produced a larva which died soon after third moult.

On 7th August, Mr. Bruce sent me twenty-four eggs of the *Oregonia*, obtained as before. The larvæ from these died off rapidly, and at all stages: seemed not to like their food. I treated them exactly as I have heretofore treated larvæ of Papilio, but I obtained only five pupæ. Some of the larvæ were certainly killed by the others, their bodies sucked dry, and this indicated, I think, a dislike to the food given. From the five pupæ up to date (21st September) have emerged four *Bairdii* imagos, 2 ♂, 2 ♀.

Thus imagos of *Bairdii* have come from eggs laid by the *Oregonia*, and in two instances *Oregonias* have come from eggs laid by *Bairdii*. As to *Hollandii* none of the *Bairdii* so far obtained are of that form, and its relationship to *Bairdii* is still but a matter of conjecture.

I am not satisfied that the form we are calling *Oregonia* is identical with the type form found in Oregon and Washington; am inclined to think it is not, and intended to propose the name *Brucei* for it. But, until more examples of the real *Oregonia* can be seen, I can come to no final conclusion.

I must not omit to say that at all stages the larvæ of these two forms are indistinguishable.

THE CLOVER-LEAF WEEVIL, PHYTONOMUS PUNCTATUS (FABR.) IN ITALY.

BY F. M. WEBSTER, WOOSTER, OHIO.

When Dr. J. A. Lintner prepared his first annual report in 1882, he, with the aid of Drs. Hagen and Le Conte, failed to discover any record of the clover-destroying habit of this species in Europe, and it was supposed at that time that this was a newly acquired habit, and occurring only in this country. Indeed, Dr. Le Conte failed to learn anything whatever in regard to the food habits of this species. As it has now entered into the Mississippi Valley and is rapidly pushing its way westward, it will be of interest to those who will have to deal with it in future to know that its taste for clover was not of American origin, but had been observed in its native home many years ago. It is a matter of surprise to me that nothing is said, by Italian observers, that gives the least hint of injury by the larvæ, which is, with us, by far its most destructive stage. Nor do I find that Sig. Piero Bargagli, from whose very useful work, *Rassegna Biologica di Rincofori Europei*, I have taken the following extract, anywhere mentions the larva of this species, which he considers under the name *Hypera punctata*, Fab.

Here in Ohio, I find that the larvæ prefer the white clover to the red, and some unsatisfactory observations of mine, made quite recently, make me feel rather suspicious that the food of the adult may include plants other than clover. At Chautauqua Lake some years ago, I observed the adults in quite numbers floating about in the water, into which I supposed they had either dropped or been blown from the trees. But if this were so, what were they doing there?

(From Rassegna Biologica di Rincofori Europei, p. 97-8, 1883-87.)

During the years 1867–70, *Medicago sativa* and *Trifolium* were very much damaged in Lombardy and Bologna by this insect; and on the 4th of June, 1868, Mr. Antonio Villa, in *Relazione sugli insetti che devastano il Trifoglio, Milano, 1868*, and again in *Sull' insetto distruttore del Trifoglio, Milano, La Lombardia, 13 giugno, 1868*, directed the attention of the agriculturists of the district of Milan to the damage proven to have been done in the districts of Melegnano and Creme, attributing the extraordinary development of this species to the remarkable drouth, followed by excessive heat, causing the destruction of carnivorous insects which were hostile to this and other species. Various remedies were

employed for destroying the pests, among the most successful being the flooding of the meadows, rolling after the cutting of the clover, and, finally, collecting with small bags or nets.

In his second article, the eminent Mr. Villa stated the fact that, in the appendix to the work of Génè *(De quibusdam insectis Sardiniæ novis aut minime cognitis, Mem. R. Accad. Sc. Torino, Ser. I., Vol. 39, Ser. II, Vol. I.)*, which had been prepared by Prof. Moretti, this species had been mentioned as among those having damaged clover. In pointing out how this insect had destroyed clover, Mr. Villa expressed the belief that an earlier attack had occurred, between the years 1834-35, in which the injuries done were similar in character to that of this species. The Station of Agricultural Entomology at Florence received notice, in June, 1879, that this insect had, in the Commune of Ferrara Erbagnana, destroyed a field of 5 ettari (about 11⅓ acres) in extent. (See ***Relazione intorno ai lavori della Stazione Entomologica agraria di Firenze,*** by ***At Targioni-Tozzetti,*** in ***Annali di Agricoltura del Ministero di Agricoltura e Commercio, Roma, 1879.)***

In the neighbourhood of Florence, besides having been found in the clover in spring, it was, nevertheless, observed in the winter among moss at the base of trees, and, though hibernating, during warm, sunny days would come forth and bask in the sun.

CORRESPONDENCE.

CHALCID PARASITE.

Sir,—I would like to record the occurrence of the following Chalcid parasite:

[illegible] Walker, on oak *(Quercus alba)* [illegible]

[illegible]

[illegible]

[illegible] Bull. [illegible] N. Hist., xv., 37.

[illegible] 3 mm. to 3.5 mm. In the males [illegible] or largely black. They [illegible] August. Bred at Woods' Holl, Mass.

HARRISON G. DYAR.

CARTEROCEPHALUS PALÆMON.

Sir,—Mr. Thomas E. Bean, in an interesting article in the June number for this year, points out the identity of *Carterocephalus mandan*, Edw., and *C. palæmon*, Pall. I think he has well proven his position, and in the proper way, which is by a study of the geographical distribution, which will always show the intergrades between the two extremes of the series. The *Palæmon* of Middle Europe and the *Mandan* of the White Mountains of N. H. look different enough, but when the series is completed by material found between the two extremes there can no longer be a doubt as to their identity. In the species that fly from the Atlantic to the Pacific, and that also exist in Europe, it will be found that the Pacific Coast examples are far closer to the European ones than those individuals found on the Atlantic slope. (See Ent. News, Vol. I., p. 84.)

The fact that *Mandan* was identical with *Palæmon* was pointed out by Moschler in *Verhandlungen der Zoologisch-botanischen Gesellchaft in Wien*, Vol. 34, 1884, p. 283. My attention was called to this synonymy by Prof. E. Bergroth, of Tammerfors, Finland.

DR. HENRY SKINNER, Philadelphia, Pa.

VARIETY OF PRIONOXYSTUS ROBINIÆ.

Sir,—In looking over my specimens of this common moth, I find a singular form that I never met with before, nor do I know of any description that has appeared in any entomological publication of a varied form of *P. (Cossus) robiniæ*, unless it may be Walker's *plagiatus*, of which I have not seen the original description. The example that I wish to make note of is a female, and differs from the regular form only in the following respects :—The whole of the sub-central inner space of the secondaries, "edging on the discoidal cell," is semi-transparent orange, similar to that which is so characteristic of the male, but it is not quite so intense in brightness of colour. The specimen is in fine condition, and is unique in appearance, when I compare it with the many examples that I have taken during the past season and previously ; hence I feel convinced that the form is remarkable enough to be burdened with a name of its own. I propose, therefore, to give it the name *P. robiniæ*, var. *quercus*, because the species is not restricted to the extermination of *Robinia pseudacacia* alone, but also does great damage to *Quercus alba, rubra and coccinea*. I have also found the pupa shells protruding from the trunks of *Fraxinus sambucifolia* in the same locality.

GEORGE A. EHRMANN, Pittsburgh, Pa.

OCNERIA DISPAR.

Sir,—I wish on behalf of the Entomological Society of Ontario to acknowledge the receipt of a box from Prof. C. H. Fernald, Ph. D., containing a complete life series of the Gypsy moth, *Ocneria dispar*. Linn., which the State of Massachusetts is making such a praiseworthy and heroic effort to exterminate. The exhibit is gotten up under the direction of Prof. Fernald, by order of the Gypsy Moth Committee, with a view to extending a knowledge of this most destructive insect. It consists of an egg mass as deposited by the female moth on the twig of a tree; two eggs exposed to view; six caterpillars, ranging from one that had just escaped from the egg to the full-grown larva, beautifully mounted; a male and a female pupa; a male moth with the wings spread, also one with the wings unspread; a female moth with the wings spread, and one unspread. A most instructive and important contribution to the Society's collection. J. ALSTON MOFFAT, Curator.

NEW LOCALITIES FOR PAPILIO HOMERUS.

Sir,—It will doubtless interest your readers to know that, notwithstanding the fact that *Papilio homerus* has thus far only been accredited to a very limited habitat in the island of Jamaica, mainly along the valleys of the Sulphur and Devil's rivers, I have recently seen it in several localities in the *terra incognita* in the highland regions of the republics of Haïti and Santo Domingo. The mountain regions of the island known to Columbus as Espanola, or Hispanola as we have it, and which is now without a name as a whole—Haïti being the name of the French-negro republic to the west and Santo Domingo of the Spanish-negro republic to the east—are practically unknown to whites, many considerable areas never having been trodden by white men since the sanguinary expulsion of the French a century ago.

On a recent trip through this interior, in the interests of a newspaper syndicate, I visited a number of localities where there was growing the large creeper, apparently belonging or allied to the genus *Ipomœa*, which I had previously discovered was the food-plant of *Homerus*, and I was not, therefore, at all surprised to occasionally see examples of this most magnificent member of its genus sailing grandly overhead. I have no doubt that the patient collector who will go up into the Cibas range and carefully explore the deep ravines of the western slopes will be rewarded with a goodly number of this valuable species. *Homerus* is most difficult of

capture, its high flight and grandly rapid movements making it more of a problem in that respect than most of its moisture-seeking congeners. But the market value of the insect is such that, taken in connection with others to be captured in that region (*P. Machaonides* being among them), patience and hard living are sure to be well paid for. Should any collector feel like attempting such a trip into the heart of that Vaudoux-ridden region, I shall be glad to offer such suggestions as may occur to me as useful to him. I shall also be glad to hear from entomologists who are interested in the insect fauna of the Andean water-shed of the Amazon tributaries, in Bolivia, Peru and Brazil, a region which I propose visiting at an early date. Letters addressed as below will be promptly forwarded to me.

EUGENE MURRAY AARON,
Care of Geographical Magazine,
79 Nassau St., N. Y.

ARGYNNIS EGLEIS.

Sir,—With this I send you a piece of pine-cone with an egg of *Argynnis Egleis* on it. Yesterday, August 8th, being an unfavourable day for collecting *Parnassius Clodius*, I went in an aimless way to find a new collecting ground. When passing along the brow of a rocky slope, I came to a *Pinus Murrayana* tree (also called *P. Contorta*), and saw a female *A. Egleis* walking over sticks and burs that were lying on the ground beneath this tree. I halted for a moment to watch her, as she gave all the outward signs of a desire to oviposit; I had not to wait long, for she walked to a pine-cone and, seizing it with her legs, curled her body and fastened on an egg as far under the cone as she could reach. She then flew about two feet and oviposited twice in succession under a stick on a small stone, and on the piece of cone that I am sending you herewith. As I was standing almost directly over her, she flew to my left foot and oviposited several times under the shadow of my instep; she came and went several times to repeat her work. I lost a day's collecting, but felt amply repaid by the novelty of the knowledge I acquired. What the next female will teach me I cannot conjecture, but trust it will be no less surprising and interesting to the butterfly-loving world.

J. B. LEMBERT,
Summit of the Sierra Nevada, Cal.

[The egg arrived safely and duly hatched out; it will evidently hibernate without feeding.—Ed. C. E.]

PAPILIO CRESPHONTES.

I was much surprised at capturing a specimen of this Southern butterfly at Roach's Point, Lake Simcoe, on the 28th of August. The locality is about fifty miles north of Toronto, and is probably the most northern point that the butterfly has reached. The specimen was worn and somewhat damaged, but another nearly perfect one was seen and chased, but escaped capture.

C. J. S. BETHUNE.

THE GOLDEN HEPIALUS.

Sir,—I have made one very interesting capture this season—*Hepialus auratus*, Grote. This rare moth was taken early in July, at Lonesome Lake, in the Franconia Mountains, about 3000 feet above the sea.

In this quiet, lonely spot Mr. William F. Bridge and Dr. W. C. Prime have a log cabin on the bank of the lake. It was in the twilight, after the sun had gone down, that my golden prize came fluttering by the open window of the cabin, and was soon in the poison bottle. It is a fine specimen, unbroken, but with some of the scales rubbed from its delicate wings. Mr. Grote described this moth in CAN. ENT., Vol. X., p. 18, from a specimen taken in the Adirondacks by Mr. W. W. Hill, in July, 1877. Ten years later Mr. E. P. Van Duzee, our well-known Hemipterist, took a specimen at Lancaster, N. Y., not far from Buffalo, and recorded the capture in Entomologist, Vol. XX., page 100. I have seen no record of any other capture, though it is of course possible that the moth is included in private collections of which I know nothing. At any rate it is among our very rarest moths, and I am glad and proud to include it in our Franconia list.

ANNIE TRUMBULL SLOSSON.

OMISSION.

On page 224 of our September issue, between the fourth and fifth lines from the bottom of the page, the following lines were unintentionally omitted:

First and third antennal joints subequal in length, some of the veins coloured with brown..... .....*levigata*, Loew.

The Annual Meeting of the Entomological Society of Ontario will be held in the rooms, Victoria Hall, London, on Wednesday, October 11th, at 3 o'clock p.m., and also at 8 p.m.

Mailed October 5th.

THE LATE PROFESSOR WESTWOOD.

The Canadian Entomologist.

VOL. XXV. LONDON, NOVEMBER, 1893. No. 11.

THE LATE PROFESSOR WESTWOOD.

We are much pleased to be able to give in this issue a likeness of the very eminent entomologist, Professor Westwood, for which we are indebted to the kindness of the publishers of the *Illustrated London News*.

John Obadiah Westwood, M.A., F.L.S., etc., was born at Sheffield, England, on the 22nd of December, 1805, and died shortly after completing his 87th year, on the 2nd of January last. His father was a die-sinker at Sheffield, but afterwards removed to Lichfield. When nearly 16 years of age, he went to London to be articled to a solicitor, and though he devoted his attention more to the study of natural history than of law, he was admitted as a solicitor and became partner in a firm. Having some private means, which he augmented by writing and drawing, he was enabled to neglect his profession and give himself up almost entirely to entomology and archæology.

To quote Mr. McLachlan's obituary notice in *The Entomologists' Monthly Magazine*, "it was probably by his rare, artistic talent that he acquired much of his justly great reputation. His drawings of insects were masterpieces of accuracy without the slightest attempt at effect, and rapidly executed; few have equalled him in correct delineation. There certainly never has been an entomologist who left behind him so much evidence, in practical work, of his ability to delineate insects, even to the most minute dissections. But Westwood was much more than an artist in entomology. There probably never has existed, and, in the present state of the science, there never can again exist, one who had so much general knowledge, both from personal investigation and a study of the works of others; one who was less of a specialist in the modern acceptation of the term. It is true he was a specialist, but it was in the way of taking up small groups in all orders, and working them out thoroughly, his artistic talent giving merit and force to those small monographs. Under a somewhat brusque manner was concealed a hearty sympathy for all real workers, and, if he offended, it was commonly in the way of pointing out to would-be introducers, etc., of supposed novelties that some one or other had already made similar observations, his vast mem-

ory rendering him very dangerous in this respect. In society there could be no more genial companion, full of anecdote, but with small appreciation of humour. At home there could be no more generous host."

Professor Westwood was best known on this side of the Atlantic from his admirable work—"An Introduction to the Modern Classification of Insects," which was published in two volumes in 1839 and 1840. Every entomologist, worthy of the name, has no doubt made a study of this book, which still continues to be the best text-book on the subject in the English language. His sumptuous works on exotic insects, such as his "Arcana Entomologica," "Oriental Entomology," and his edition of Drury's "Exotic Insects," are also widely known, but his numerous contributions to various Natural History periodicals, a mere list of which would fill a volume, are not so familiar to our students. He was a most industrious and prolific writer, and made investigations in almost every family of insects in all the orders. His work is always characterized by its marvellous accuracy and patient elaboration of details both of structure and habit. Very rarely was he ever known to make a mistake.

He was actively associated with the Entomological Society of London from its foundation in 1833, and was for many years its Secretary. Subsequently he was elected President at three periods of two years each, and was made Honorary Life President when the Society celebrated its jubilee in 1883. He was a Fellow of the Linnæan Society from 1827, and an Honorary or Corresponding Member of Scientific Societies all over the world.

In 1858 the Rev. F. W. Hope, a wealthy amateur, who had been for years a warm friend and patron of Westwood, and had purchased his collections, gave them and his own to the University of Oxford, and founded a Professorship of Invertebrate Zoology, which bears his name. Westwood was appointed the first Hope Professor, and, in consequence, removed to Oxford, where he was a conspicuous figure in the University for five and thirty years.

Besides his Entomological work, he was a distinguished Archæologist and was widely known amongst those of kindred tastes by his investigations of the "Palæographia Sacra Pictoria," his "Lapidarium Walliæ," and "Fac Similes of the Miniatures and Ornaments of Anglo-Saxon and Irish Manuscripts." He formed a remarkable collection of carved ivories and inscribed stones, as well as of insects. In all respects he was a remarkable man, and accomplished, by dint of steady industry and enthusiastic perseverance during a long life, an amount of valuable scientific work that has rarely, if ever, been excelled.

THE FIFTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

ABSTRACTED FROM THE OFFICIAL MINUTES BY L. O. HOWARD, FOR THE CANADIAN ENTOMOLOGIST.

The fifth annual meeting of the Association of Economic Entomologists was held at Madison, Wisconsin, in the Science Hall of the University of Wisconsin, on August 14, 15 and 16, 1893.

Sixteen members were present, as follows :—President S. A. Forbes, Second Vice-President J. B. Smith, Secretary H. Garman, J. M. Aldrich, G. F. Atkinson, G. C. Davis, C. P. Gillette, A. D. Hopkins, L. O. Howard, M. E. Murtfeldt, H. Osborn, C. V. Riley, P. H. Rolfs, H E. Summers, F. M. Webster and H. E. Weed. A number of visitors and members of other scientific associations were present during the sessions, making rather a large attendance.

The following papers were presented, among them several from foreign entomologists, and the discussions were of the greatest interest. I shall briefly mention the papers in the order of their presentation :—

The annual address of President S. A. Forbes reviewed the 115 economic articles containing new matter published by members of the Association since the last meeting. These articles he grouped by subjects and by nature of outcome, thus giving an admirable idea of the work of the year in shape for the drawing of conclusions. He called attention to a narrowness of view and consequent inadequacy in the treatment of general questions, due to the want of comprehensive organization and systematic co-operation. In his opinion the methods of publication and enforcement of results now in general use fall far short of their final end. As a result the farmer has not responded to the suggestions of the investigating entomologist as might be anticipated. He suggested that more attention might be paid to describing the effects of the insect work than to the insects themselves, subordinating the account of the insects. He insisted that instead of making an entomologist of the farmer we should make a farmer of the entomologist. He suggested distinguishing between the temporary and permanent presentation of facts in economic publications, advising the preparation of special economic summaries or monographs of all insect injuries to each of the various crops, and printing and distributing these summaries in great numbers. Co-operation in this particular line was urged. Addresses to Farmers' Institutes should be accompanied by a printed résumé to be distributed among those present.

He spoke of the fact that the boundaries of the States represented by official entomologists are artificial, and that in consequence matters of distribution and other broad questions are seldom touched. This fact and the danger of unnecessary duplication of work, and other reasons, called for organziation, and this organization should be of flexible form, leaving each individual free to meet the special requirements of his individual work, and at the same time helping to concentrate the surplus effort which should be contributed to the accomplishment of common ends. He suggested that a committee on co-operation propose a list of subjects in which co-operative effort is desirable. These subjects should then be attacked by volunteers, who should report to the committee. In this way he thought that the benefits of organization might be obtained without the surrender of individual initiative.

The address was discussed by Messrs. Osborn, Smith and Webster. Messrs. Osborn, Smith and Garman were appointed a committee of three to consider the recommendations contained in the address.

Messrs. Edward H. Thompson, of Tasmania, R. Allan Wight, of New Zealand, and G. C. Davis, of Agricultural College, Michigan, were elected to membership.

Mr. Osborn presented a paper entitled "Methods of Treating Insects affecting Grasses and Forage Plants." In this paper he considered the insects affecting these crops by groups arranged according to the method of treatment, discussing particularly climatic conditions, natural enemies, agricultural methods and the direct method. He presented a most interesting table of insects, showing in horizontal columns the food-plants, number of annual broods, and the condition in which the species is to be found during any month in the year. The paper was discussed by Mr. Hopkins.

The next paper, by Mr. Howard, was entitled "Notes on Methods of studying Life-histories of Injurious Insects," in which he described the vivarium methods in use in the Division of Entomology of the U. S. Department of Agriculture, but insisted that outdoor work is preferable where feasible. The question of methods of ventilation of the insectary and kindred topics were discussed by Messrs. Forbes, Garman and Howard. Mr. Forbes thought that indoor work on life-histories should always be verified by outdoor observation.

Under the caption "Another Mosquito Experiment," Mr. Howard detailed his experience with the use of kerosene on the surface of mosquito

breeding pools since his announcement of his first experiment a year ago. Mr. Smith in discussion mentioned two cases where this remedy had been applied effectually on Long Island. Mr. Webster thought that further experimentation was needed on the line as to the office of mosquito larvæ in destroying organic matter in water, which might otherwise become offensive.

The Secretary read a paper by Dr. Ritsema Bos, on "*Phytomyza affinis*, Fall., as a Cause of Decay in Clematis." The larvæ of this little fly he had found to produce a disease spot on the stem a little above the level of the ground, causing the subsequent drying up of the stem. He found two generations of the fly each year, and advised the cutting off and burning of decaying stalks in early summer. Messrs. Hopkins and Garman reported similar appearances in potato stalks and the terminal twigs of apple, which were probably due to a closely allied insect.

Mr. Smith read a paper on "Farm Practice and Fertilizers as Insecticides." The nature of the paper is well indicated by its title. A number of instances were pointed out where variation in farm practice produces excellent insecticide results, and others in which commercial or artificial fertilizers destroy subterranean insects as well as invigorate the crop. The intelligent use of fertilizers combined with other intelligent farm practice, in his opinion will in the future prove the main reliance of the farmer. He showed, however, that the phosphates form a group of fertilizers which have no insecticide value.

Messrs. Garman and Webster discussed this paper, and agreed that the main beneficial results in the use of artificial fertilizers are due to the increased vigour of the plant, enabling it to better resist the attacks of insects. They doubted the primary insecticide effect of these compounds.

The above papers were all read at the first session of the Association, on the afternoon of August 14. At the second session, on the morning of the 15th, letters were read from certain foreign entomologists regretting their inability to attend the meeting.

Mr. Garman presented a paper on the "Preservation of Larvæ for Study." He drops the larva into water heated to the boiling point, leaving it for 15 seconds. Then, when the body wall is somewhat rigid, he takes it up with the forceps, and with a fine sharp scissors cuts a slit along the underside of the body, dropping it into the water again for a few seconds longer. It is then transferred to 50% alcohol, and in 12 hours to 70%, and in 12 hours afterwards to 95%, for permanent preservation.

Shape, colours and structure are well preserved in this way. As a substitute for alcohol he recommends:—boiling water, 250 cc.,; common salt, 3 teaspoonfuls; powdered alum, one teaspoonful; pure carbolic acid, 5 drops; filter.

Mr. Forbes spoke of the preservation of fruits at the World's Fair, and suggested that plants injured by insects may be preserved in the same way. Mr. Summers had found nothing which would satisfactorily preserve fruits. Mr. Osborn thought that aqueous preparations would freeze. Mr. Smith has employed with success methods similar to those of Mr. Garman.

A paper by Mr. Cockerell, entitled "The Distribution of Coccidæ," was read by the Secretary. He compared the Coccidæ of the West India Islands with the adjoining mainland, and spoke of the further distribution of a number of species which he had studied in Jamaica. Of 18 species found on that Island all but 3 are known elsewhere, and 11 have been detected outside of neotropical regions.

Mr. Hopkins presented his views on "Note and Record-keeping for the Economic Entomologist." He described the system which he has worked out and adopted, and which he has proved to be well adapted to the requirements of his work. The system consists of an accession catalogue and a species catalogue. Specimens of his cards or note pads were exhibited, and Messrs. Smith, Osborn and Webster discussed the paper, Mr. Webster giving in full his own system of note-keeping. Messrs. Smith and Osborn objected to the use of check-list numbers alone for species as adopted by Mr. Hopkins.

Mr. Garman's paper on "Illustrations for the Economic Entomologist" was next presented. He considers that the object of illustrations is to convey information and to save time in description, finish and technique, being, therefore, matters of secondary importance. The different methods of reproducing drawings was very carefully and fully discussed. Etching was considered in general impracticable, as calling for a special method of drawing. Lithography was considered too expensive, and wood engraving is subject to liability of the engraver to misinterpret certain details of the drawing; but at the same time it was admitted that of our published figures wood-cuts are the best. In spite of its disadvantages, it is the most satisfactory method, although somewhat expensive. Cheap process figures are excellent for newspaper and other transient literature. Their right in permanent literature, and especially in scientific

writings, is questionable at the present time. No cheap process known to the writer gives good results in shaded figures. These figures give promise of something better in the near future. If it were not, however, for this hopeful outlook, it would be well to return to wood-engraving. Entomologists were urged to make their drawings with extreme care and to adapt them to a particular process, and not to rest satisfied with inferior reproduction. The paper was discussed by Messrs. Osborn, Weed, Smith, Hopkins, Gillette, Forbes and Howard.

Mr. Gillette read a paper on "The Arsenites and Arsenical Mixtures as Insecticides." The article comprised a general summary, historical and critical, of the use of these substances in their different combinations. The paper was discussed briefly by Messrs. Beal, Wood and Galloway, all of whom were present at the meeting, although not members of the Association.

Upon invitation, Mr. B. T. Galloway, Chief of the Division of Vegetable Pathology of the U. S. Department of Agriculture, gave a short account of some recent work done in his division upon a bacterial disease of melons and other cucurbits, which had been found to be largely disseminated by the agency of insects, particularly of *Diabrotica vittata* and *D. 12-punctata*. Messrs. Webster, Smith and Garman had seen the same disease in their respective localities.

At the third session, held in the afternoon of August 15, an amendment to the constitution was adopted levying annual dues of fifty cents upon each member of the Association, and a resolution was passed authorizing the publication of the whole proceedings in *Insect Life*, and the sending of an abstract to the CANADIAN ENTOMOLOGIST.

Messrs. Osborn, Webster and Weed were appointed a committee on nomination of officers.

Mr. Hopkins read a paper on "Destructive Scolytidæ and Their Imported Enemy." He gave a summary of the damage done by bark-boring bettles in West Virginia and other portions of the country, and his investigation of this damage in the former State. He further described his trip to Germany during 1892, and the collection of about 1,000 specimens of *Clerus formicarius*, which he brought alive to this country. He described the placing of the insects and their over-wintering. Up to the time of presentation of the paper no means of ascertaining to what extent the insects have multiplied had been found.

Mr. Riley presented a communication entitled "Parasitic and Predaceous Insects in Applied Entomology." He indicated the utility and importance of the subject, and pointed out the dangers and disadvantages resulting from false and exaggerated opinions. He gave an extended summary of the methods in which insect enemies of insects may be utilized; and followed with a chronological and detailed account of the suggestions and attempts, successful and otherwise, to introduce parasites and predaceous insects into one portion of a country from another, or into one country from another. He showed that the general laws governing the interactions of organisms, however, are such that we can in only very exceptional cases derive benefit by interference with them. The indigenous enemies of an indigenous insect are better qualified to keep it in check than an imported species. Where the injurious insect is a foreigner, however, and has been brought over without the enemy which keeps it in check in its native home, then the introduction of these enemies will be advisable. Thus the introduction of the European parasites of the Gypsy Moth would be advisable. Such an introduction could do no possible harm, and may be productive of lasting good.

Mr. Smith followed with a paper in the same line, called "The Economic Value of Parasites and Predaceous Insects." The writer, while realizing the importance of parasites in maintaining the balance of nature, felt that their economic value has been grossly over-estimated. He showed that parasites simply reduce excess, but only after damage to crops has been done. The practical utilization of parasites is more or less a myth, except in very exceptional cases like that of Vedalia and Icerya. An injurious insect which under natural conditions is abundant each year, must be dealt with without regard to parasites or natural enemies.

Mr. Webster read a paper on "Insect Foes of American Cereal Grains, with Measures for Their Prevention or Destruction." In the main the author insisted upon the importance of proper farm practice. He knows of no better insecticide than good farming. Four-fifths of the injury done by the Hessian Fly may be prevented by a better system of agriculture. The same point was elaborated with regard to other grain insects, and the serious ravages of a number of the most important pests were pointed out, and general consideration of the proposed direct remedies was entered into. In the opinion of Mr. Webster, the field of the economic entomologist is poorly defined at present,

and too much is expected from him. The science of applied agriculture should relieve him of some of his duties. This paper was discussed in some of its details by Messrs. Riley, Forbes and Howard.

The fourth session was held on the morning of August 16. The Committee on the President's Address reported in favor of the adoption of his recommendations and the appointment of a standing committee to present a detailed plan for co-operative work among members, and to make recommendations concerning legislation. The report was adopted, and Messrs. Osborn, Smith and Garman were appointed as a committee.

Mr. Forbes read a paper by H. Du Buysson upon "Fumigation with Carbon Bisulphide for the complete and rapid destruction of Insects which attack Herbaria, Furrieries and Woollen Stuffs." In this article a very ingenious and interesting water joint for the box used for fumigating purposes was described, and the best method of employing the box for the different classes of objects mentioned in the title was given. Mr. Atkinson stated in discussion that he had used a very similar box in fumigating objects infested by insects. Mr. Garman stated that at Cambridge a zinc-lined case was constantly used for disinfecting bird and mammal skins. Mr. Riley had used the bisulphide in the insect collections of the National Museum. Mr. Smith had used it against ants and Mr. Garman against the melon louse. The latter gentleman rolls the melon vines up into a heap, inverts a tub over them, and places a little bisulphide in a saucer under the edge of the tub.

Mr. Atkinson read a paper by Dr. J. Ritsema Bos, on "Aphelenchus olesistus, nov. sp., a nematoid worm, causing Leaf-sickness in Begonia and Asplenium." He referred to a note by Mr. Atkinson, read at the preceding meeting of the Association, in which an Anguillulid is described as affecting leaves of Chrysanthemum and Coleus, making no swelling or deformity, but causing brown patches on the leaves. The author having studied and described *Aphelenchus olesistus* in Europe, where it causes almost precisely the same trouble with Begonia and Asplenium, he is inclined to think that the species previously mentioned by Mr. Atkinson is identical. In the discussion, Mr. Atkinson stated that while there were characters in the form studied by him which seemed to place it in the genus Tylenchus, he thought that careful comparison of types might show the two to be identical.

Mr. Osborn presented a paper on "Methods of Attacking Parasites of Domestic Animals." The preventive measures consisted in the ex-

amination of the introduced animals and the application of the usual direct methods. A critical summary of all the proposed remedies followed. The paper was briefly discussed by Messrs. Gillette, Aldrich, Riley, Hopkins, Weed and Howard. Mr. Riley, in speaking of the alleged poor success on the part of certain individuals in the use of kerosene emulsion, said that the difficulties of making a good emulsion and of getting intelligent farmers to use it safely are unnecessarily magnified. He further stated that he could not accept the opinion that in the case of two given remedies the poorer one was to be recommended, because the better one required a little more care and intelligence in making and using.

In the paper by Mr. Weed on "Remedies for Insects Injurious to Cotton," the author discussed the application of Paris green against the Cotton Worm by means of bags at the extremities of a long pole, carrried by a "darkey" on a mule, going at a brisk trot between the rows. This he considered to be the most simple apparatus which he had seen for distributing dry poisons. For the Boll Worm, he considered the best application to be the planting of a row of corn about every tenth row through the cotton field at such a time that it will mature early in September.

In Miss Murtfeldt's paper on "The Cheese or Meat Skipper," which followed, the author drew an interesting parallel between the tendency of the farmer to exaggerate his losses from insect damage and that of the commercial man to underestimate this damage and to conceal it because of its possible influence upon his trade. She reviewed the literature of *Piophila casei*, and said that accounts of its life-history are not readily accessible in this country. She gave a popular synopsis of her personal observations upon the species, particularly as injuring hams. The larvæ feed principally around the bony ends among the tendons, and in the fat and in the oil-saturated folds of the canvas wrappers. Hibernation is in the adult stage. About thirty eggs are laid by each female. The larval stage lasts from seven to eight days, and the puparium state about ten days. There is no definite succession of broods, and the insect may be found in all stages from May until November. The flies are readily killed by the fumes of burning sulphur or pyrethrum powder. The covering of windows with a light domestic is advised, as the flies will get through ordinary wire screens. The paper was briefly discussed by Messrs. Aldrich and Riley.

Mr. Coquillett's paper, entitled "Hydrocyanic Acid Gas as an Insecticide," was read by the Secretary. The paper consisted of an historical review of the use of this gas in California, together with an account of the methods in use at the present time, and some slight consideration of its effect upon different insects. The cost of fumigating a tree varies from five cents to one dollar, and even at the latter rate figures were produced to show that it is economical.

A paper by Dr. J. A. Lintner, on "Arsenical Spraying of Fruit Trees while in Blossom," was read by Mr. Smith. The author reviewed the experiments by Mr. Webster, and the statements by Mr. Cook, and suggested that the whole question can be settled by confining a hive of healthy bees to blossoms sprayed with Paris green, and afterward testing the stomach for arsenic. The law against spraying while trees are in blossom, as passed by the Legislature of Ontario, was reviewed, and a long list of the insects which might be satisfactorily treated by arsenical spraying at the time of blossoming was given. Further experimentation was strenuously urged. Some discussion followed by Messrs. Webster and Garman.

The fifth session was held in the afternoon of the 16th August. The following officers for the ensuing year were elected :—

President, L. O. Howard.
First Vice-President, J. B. Smith.
Second Vice-President, F. L. Harvey.
Secretary, C. P. Gillette.

Three papers on the insects of the season in their respective localities were read by Messrs. Webster, Smith and Osborn, and were discussed by Mr. Riley.

A paper by Mr. R. Allan Wight, of Auckland, New Zealand, was read by Mr. Osborn; it was entitled "*Icerya purchasi* and *Vedalia cardinalis* in New Zealand." The paper consisted of a condensed summary of the history of these two insects in New Zealand and their inter-relations. This paper was discussed by Mr. Riley.

Mr. Smith then read a paper by Mr. F. W. Urich, of Port of Spain, Trinidad, consisting of "Notes on Some Insect Pests of Trinidad, B. W. I." The paper was an interesting summary of Mr. Urich's observations on the injurious insects of that Island, and referred mainly to Coccidæ and their natural enemies, a leaf-cutting ant (*Atta sexdens*), a longicorn beetle (*Steirastoma depressum*) and certain Acridiidæ. Especial mention of a little Cyprinodont fish was made. This fish is found commonly all through Trinidad, and feeds upon mosquito larvæ. Mr. Urich suggested its introduction into America for use in tanks and ponds.

The Secretary then read a "Note on Slip-records," by Mr. Cockerell. The author suggested the use of a uniform system of notes upon slips of a uniform size by all entomologists, and submitted samples. The question was discussed by Messrs. Hopkins, Summers and Riley.

The Association then adjourned subject to the call of the Executive Committee.

LIST OF COLEOPTERA TAKEN AT SPARROW LAKE, ONT.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Sparrow Lake is an expansion of the Severn river, situate a little south of lat. 45° and east of 80° longitude. Geologically, this part of Ontario belongs to the Laurentian formation, and that of a very rugged type. The southwest side of the lake, where these coleoptera were taken, save in a few spots among the rocks, is wholly uncultivated and uncultivable to the Georgian Bay, a distance of from 20 to 30 miles. Till recently it sustained an immense forest growth, mostly pine, which has now disappeared, and has been succeeded by a dense and almost impenetrable jungle of briars and bushes of many deciduous species.

So far as coleoptera are concerned, a large majority of the species inhabiting this district must be considered autocthonous, and it is not difficult to determine approximatively such as are following the little spots of cultivation that are being interjected. The collecting was done from July 20th to August 15th. That the list is no longer is not altogether the fault of the collector; in fact, in addition to the paucity of species, while some are in great abundance, the majority are each represented by from one to three examples only.

As this part of Ontario is in a comparatively primitive condition, and no record of the coleoptera inhabiting it has been observed, the subjoined list may be of some interest:—

Cicindela repanda, *Dej.*
var. 12-guttata, *Dej.*
Cychrus Lecontei, *Dej.*
Carabus sylvosus, *Say.*
Calosoma scrutator, *Fab.*
Wilcoxi, *Lec.*
calidum, *Fab.*
Elaphrus ruscarius, *Say.*
Loricera cærulescens, *Linn.*
Nebria pallipes, *Say.*
Scarites subterraneus, *Fab.*
Dyschirius nigripes, *Lec.*
Bembidium patruele, *Dej.*
versicolor, *Lec.*
Sp. undetermined.
Pterostichus corvinus, *Dej.*
erythropus, *Dej.*
Amara exarata, *Dej.*
pallipes, *Kirby.*
rubrica, *Hald.*
Calathus gregarius, *Say.*
Platynus sinuatus, *Dej.*
extensicollis, *Say.*
atratus, *Lec.*
melanarius, *Dej.*
corvus, *Lec.*
placidus, *Say.*
Bogemanni. *Gyll.*
ruficornis, *Lec.*
Galerita janus, *Fab.*

Tachys nanus, *Gyll.*
flavicauda, *Say.*
Patrobus longicornis, *Say.*
Pterostichus honestus, *Say.*
coracinus, *Newm.*
stygicus, *Say.*
lucublandus, *Say.*
caudicalis, *Say.*
luctuosus, *Dej.*
Agonoderus pallipes, *Fab.*
Harpalus erraticus, *Say.*
viridiæneus, *Beauv.*
Sp. undetermined.
pennsylvanicus, *De G.*
fallax, *Lec.*
pleuriticus, *Kirby.*
viduus, *Lec.*
Stenolophus plebeius, *Dej.*
conjunctus, *Say.*
Anisodactylus Harrisii, *Lec.*
interstitialis, *Say.*
Ilybius biguttalus, *Germ.*
Hydaticus stagnalis, *Fab.*
Dytiscus fasciventris, *Say.*
Gyrinus canadensis, *Reg.* ?
analis, *Say.*
Berosus striatus, *Say.*
Philydrus perplexus, *Lec.*
Hydrobius fuscipes, *Linn.*
Creniphilus sub-cupreus, *Say.*
Cercyon pygmæum, *Ill.*
Necrophorus vespilloides, *Hbst.*
Silpha Americana, *Linn.*
Pæderus littorarius, *Grav.*
Sunius longiusculus, *Mann.*
Tachinus repandus, *Horn.*
fimbriatus, *Grav.*
Erchomus ventriculus, *Say.*
Lebia viridis, *Say.*
Metabletus americanus, *Dej.*
Cymindis pilosa, *Say.*
Brachynus cyanipennis, *Say.*
Chlænius sericeus, *Forst.*
pennsylvanicus, *Say.*
Anomoglossus emarginatus, *Say.*
Brachylobus lithophilus, *Say.*
Liodes discolor, *Mels.*
Homalota trimaculata, *Er.*
Bolitochara picta, *Fauv.*
Aleochara bimaculata, *Grav.*
graciliformis, *Fauv.*
Gyrophæna vinula, *Er.*
Quedius fulgidus, *Fab.*
lævigatus, *Gyll.*
Listotrophus cingulatus, *Grav.*
Creophilus maxillosus, *Linn.*
Staphylinus violaceus, *Grav.*
Philonthus politus, *Linn.*
longicornis, *Steph.*
micans, *Grav.*
cyanipennis, *Fab.*
sordidus, *Grav.*
Sp. undetermined.
Xantholinus obsidianus, *Mels.*
emmesus, *Grav.*
obscurus, *Er.*
N. S. (found here).
Baptolinus longiceps, *Fauv.*
Stenus—3 sp.
Lathrobium punctulatum, *Lec.*
bicolor, *Lec.*
Stilicus, sp.
Histerdepurator, *Say.*
sedecimstriatus, *Say.*
carolinus, *Payk.*
Lecontei, *Mars.*

Conosoma pubescens, *Payk.*
Boletobius cincticollis, *Say.*
Olisthærus substriatus, *Gyll.*
Oxyporus femoralis, *Grav.*
rufipennis, *Lec.*
Oxytelus sculptus, *Grav.*
pennsylvanicus, *Er.*
insignitus, *Grav.*
Trogophlœus 4-punctatus, *Say.*
Scaphisoma convexum, *Say.*
Hippodamia 13-punctata, *Linn.*
Coccinella trifasciata, *Linn.*
Chilocorus bivulnerus, *Muls.*
Psyllobora 20-maculata, *Say.*
Hyperaspis signata, *Oliv.*
Scymnus lacustris, *Lec.*
Endomychus biguttatus, *Say.*
Tritoma thoracica, *Say.*
Silvanus bidentatus, *Fab.*
Lemophlæus fasciatus, *Muls.*
Calopteron terminale, *Say.*
Calochromus perfectus, *Say.*
Ellychnia corrosa, *Linn.*
Telephorus fuscus, *Fab.*
scitulus, *Say.*
Collops tricolor, *Say.*
Trichodes Nuttalli, *Kirby.*
Hydnocera pallipennis, *Say.*
longicollis, *Lec.*
Cistela [illegible], *Muls.*
Cnodalon [illegible], *Dejean.*
Orchesia [illegible], *Payk.*
Dircæa striatula, *Say.*
Uleta, *Horn.*
Aplocnemus [illegible], *Lec.*
tumidus, *Lec.*
[illegible], *Horn.*
[illegible], *Horn.*

Epuræa Erichsonii, ***Reit.***
Sp.
Ips fasciatus, *Oliv.*
Stephostethus liratus, *Lec.*
Corticaria pusilla, *Mann.*
pumila. *Lec.*
Tenebrioides corticalis *Mels.*
Cyphon obscurus, *Guer.*
Deltometopus amœnicornis, *Say.*
Dromaeolus Harringtoni, *Horn.*
Alaus myops, *Fab.*
Agriotes fucosus, *Lec.*
Sp.
Melanotus castanipes, *Payk.*
fissilis, *Say.*
Corymbites medianus, *Germ.*
propola, *Lec.*
Dicerca tuberculata, *Chev.*
Sp. undetermined.
Buprestis rusticorum, *Kirby.*
fasciata, *Fab.*
Agrilus ruficollis, *Fab.*
Valgus canaliculatus, *Fab.*
Hylotrupes bajulus, *Linn.*
ligneus, *Fab.*
Calloides nobilis, *Say.*
Arhopalus fulminans, *Fab.*
Xylotrechus sagittatus, *Germ.*
Clytanthus ruricola, *Oliv.*
Enderces plcipes, *Fab.*
Desmocerus palliatus, *Forst.*
Centrodera decolorata, *Harr.*
Gaurotes cyanipennis, *Say.*
Typocerus sparsus, *Lec.*
velutinus, *Oliv.*
Leptura atteus, *Forst.*
canadensis, *Oliv.*
vagans (var. brevis, *Kirby.*)

Aphodius lentus, *Horn.*
Geotrupes splendidus, *Fab.*
Anomala lucicola, *Fab.*
Ligyrus relictus, *Say.*
Euphoria fulgida, *Fab.*
Osmoderma scabra, *Beauv.*
Trichius affinis, *Gory.*
Pachybrachys femoratus, *Oliv.*
hepaticus, *Mels.*
Monachus saponatus, *Fab.*
Diachus auratus, *Fab.*
Adoxus obscurus (var. vitis, *Fab.*)
Xanthonia 10-notata, *Say.*
Typophorus canellus (var. aterrimus.)
Chrysochus auratus, *Fab.*
Rhabdopterus picipes, *Oliv.*
Doryphora 10 lineata, *Say.*
Chrysomela bigsbyana, *Kirby.*
Galerucella nymphææ, *Linn.*
Diabrotica 12-punctata, *Fab.*
" vittata, *Fab.*
Phyllobrotica decorata, *Say.*
Cerotoma 3-furcata, *Forst.*
Dysonycha pennsylvanica, *Illig.*
Haltica ignita, *Illig.*
Crepidodera helxines, *Linn.*
Epitrix cucumeris, *Harris.*
Systena hudsonias, *Forst.*
marginalis, *Illig.*
Nyctobates pennsylvanica, *De G.*
Xylopinus saperdioides, *Oliv.*
Monohammus confusor, *Kirby.*
Urographis fasciatus, *De G.*
Saperda vestita, *Say.*
3-dentata, *Oliv.*
Amphionycha flammata, *Newm.*
Donacia palmata, *Oliv.*
piscatrix, *Lac.*
proxima, *Kirby.*
2 sp. not determined.
* Tenebrio molitor, *Linn.*
Blapstinus interruptus, *Say.*
Uloma impressa, *Mels.*
Diaperis hydni, *Fab.*
Boletotherus bifurcus, *Fab.*
Cistela sericea, *Say.*
Penthe pimelia, *Fab.*
Eustrophus confinis, *Lec.*
Canifa pallipes, *Mels.*
Stenotrachelus arctatus, *Say.*
Anaspis rufa, *Say.*
Mordella melæna, *Germ.*
marginata, *Mels.*
Xylophilus tuberculifer, (*infra.*)
Epicauta pennsylvanica, *De G.*
Attelabus bipustulatus, *Fab.*
Ithycerus noveboracensis, *Forst.*
Lissorhoptrus simplex, *Say.*
Magdalis armicollis, *Say.*
Orchestes niger, *Horn.*
Gymnetron tetrum, *Fab.*
Balaninus uniformis, *Lec.*
Eupsalis minuta, *Drury.*
Dryocœtes, n. sp.

Loricera cærulescens, *Linn.* (*pilicornis*, Fab). A few examples of this interesting beetle were taken on the margin of the lake under pieces of drift partly immersed in the water. It seemingly avoids muddy places.

Chlænius pennsylvanicus, *Say.* A variety, or rather individuals of this species, occurred with the margins of the elytra bordered with rufous like

in *circumcinctus*, but which lack the smooth facets of the thorax of that species. This is the *circumcinctus* seen in some Canadian lists, but the true *circumcinctus* does not inhabit Canada.

Aleochara graciliformis, *Fauv.* This species, though named many years ago by Mr. A. Fauvel (as I am informed), has never found a place in our catalogue. It has been in my collection from various places in Ontario for several years. It is a very pretty species, black, thorax without impression, legs and elytra bright rufous; an occasional individual has the sides of the elytra narrowly black, and while such are more finely punctate and have darker legs they are not considered distinct.

Philonthus politus, *Linn.* (*aeneus* Rossi). This species was correctly determined by both Kirby and Macklin. It is nearly cosmopolite. The *politus* of our catalogue must be changed to *fuscipennis*, Mann. These are the latest decrees of synonymists.

Creophilus maxillosus, *Linn.* Systematists now recognize but one species of *creophilus* as inhabiting North and South America, Asia, Northern Africa and Europe. It exists in about ten named varieties or variations, *villosus*, Grav., and *bicinctus*, Mann., being the American forms.

Bolitochara picta, *Fauv.* This species was as abundant as in Pennsylvania, being gregarious on mushrooms. My types of this species are from Mr. F. Blanchard, for whom it was determined by Mr. A. Fauvel. It has the habit of a Gyrophæna. The antennæ, head, thorax, and last segments of the abdomen are dark; the legs, 3 to 4 segments of the abdomen, and pro and mesothorax are pale; the elytra are pale, with an ill-defined triangular space posteriorly and sometimes a spot around the scutellum dusky. There is at the middle of the base of the thorax a circular depression marked anteriorly with two comma-like impressions. Length, .10 inch.

Baptolinus? longiceps, *Fauv.* As Mr. A. Fauvel has stated that he had seen examples of *longiceps* from Canada, special search was made for that species, resulting in the taking of four examples, which, while not agreeing with Mr. Fauvel's characters of *longiceps* in every respect as given in his synopsis ("Tête alongée, non transverse, un peu plus etroite que le corselet; corps brun; élytres ponctuées"), probably do not vary beyond specific limits; the elytra are rather alutaceous than punctured; the form of the head—"long or transverse"—is opinionative; the colour of the elytra, thorax and head, piceous. One example taken here and two others at Ligonier, in the Alleghanies, are in every way identical

Mr. A. D. Hopkins, Entomologist of the West Virginia Agricultural Experiment Station, to whom one of the Canadian examples was submitted for comparison, kindly states that there is "little perceptible difference" between it and that named *longiceps* for him by Dr. Riley through the National Museum. In the seven examples seen no sexual differences are observable in the head or abdomen. I have examples of a species occurring in the White Mountains of New Hampshire, which is quite different, having a very large head, especially the ♂. It has received the name *macrocephalus*, Nord, but from which it differs by not having the 6th ventral segment of the ♂ emarginate and the thorax tripunctate (Mannerheim's description). I have two female examples from Alaska—one from Wrangel with the thorax tripunctate (*macrocephalus*) agreeing in every other essential point with the New Hampshire females; and one from Prince of Wales Island, with the thorax bipunctate, entirely pallid, and .15 inch long, but otherwise agreeing with the Wrangel example; more material, however, must be seen before their identity can be assured. Thus it appears there are at least three distinct species of *Baptolinus* inhabiting North America, whatever may be said of names. This is the species mentioned as *pilicornis* in CAN. ENT., XXIV., 293, but more material shows that the head is smaller than in that species, the description of which otherwise is fairly applicable; and it is in many ways different from the New Hampshire species. In the article referred to, read (Rev. Entomol., VIII, 117)., *B. longiceps*, Fauv., instead of as in lines 28-29. Mr. F. Blanchard mentions (*in litt*) an example with the head scarcely punctured, taken by him in North Carolina, which probably belongs here.

Dicerca, sp. Two examples, ♂ and ♀, were taken in the lake, which seem to be nondescript; in size and sculpture they resemble Chrysea, *Mels.*, to which they were about to be referred till the terminal ventral segment of the ♀ was observed to be rounded; the same segment of the ♂ is truncate and rectangularly emarginate, and the middle tibia toothed. Other examples were subsequently seen in another collection, and it is possibly confused in northern cabinets with *chrysea*, from which it seems best separated by the sexual characters of the female.

Aphodius leopardus, *Horn*. This species occurred in some abundance, as it likewise did at Parry Sound on the Georgian Bay, and at intermediate points. It was not taken with the other species about cow-yards, but on paths through the forest. Before the introduction of domestic

cattle it probably lived in the ejectamenta of deer, moose and other wild animals; only one example of *lentus* was taken, and that in the forest; *fossor* was common, and whether it was originally introduced into America from Europe is not free from doubt—it seems to inhabit the colder and mountainous regions, and in Pennsylvania is not uncommon in the Alleghanies. *Ruricola* and *fimetarius* were excessively abundant everywhere, and seem to follow cultivation. *Inquinatus* has not as yet appeared in this district.

Dialytes Ulkei, *Horn.* Two examples were taken at Sparrow Lake and another at Rosseau, about 50 miles northward. The type of the species was taken at Deer Park, Maryland, and it is not known to me whether it has ever been duplicated.

Leptura Canadensis, *Oliv.* Occurred in some abundance; it breeds in the bark of dead pine trees like *Urographus fasciatus* does in that of oak, without entering the wood. All the females seen had the base of the elytra red; there is no uniformity in the coloration of the outer joints of the antennæ of the ♀; the 3rd joint is usually black, with sometimes a pale spot at base; the 4th is commonly pale at base for half its length, sometimes the lower side is pale for its whole length and the upper black, or again there is merely a pale spot at base; the 5th is mostly half black, but sometimes with only a pale basal spot; the 6th may be altogether pale, or with the apex black, or with it spotted on one side or on both; the 7th is altogether black, but exceptionally with a pale basal spot; the 8th is altogether pale, with the apex sometimes black; the 9th is as the 7th; the 10th is usually pale at base, but sometimes altogether black. The antennæ of the ♂ are black, but in some examples there is a pale spot at the base of joints 6 and 8. These particulars have been entered into to show that antennal colour variation cannot be used to separate into species the variable forms now included in *Canadensis*.

Leptura vagans, *Oliv.* (var. *brevis*, Kirby). This variety should be placed in our catalogue, inasmuch as it exists locally of a fairly constant type; that is, with dark elytra with a sulphur-yellow discal vitta on each; this was absent in one example, which was entirely black. The *vagans* form has usually yellow elytra, some examples being marked with brown indefinitely. Without notice it requires some research to discover that *brevis* is *vagans*.

Adoxus obscurus, *Linn.* (var. *vitis*, Fab). This was beaten in great abundance mostly from willow, though that this is its only food-plant is

not affirmed. The variety *vitis* is light brown, very constant in colour, and so far the only form occurring in Canada. The variety *obscurus* is taken abundantly in places throughout the Rocky Mountains to Arizona and New Mexico; typically it is black, but many of the examples are rufous, and in some of these the rows of punctures on the elytra are black, causing a vittate appearance. This rufous form is readily distinguished from *vitis* by the greater intensity of the colour and the much coarser punctostriation of the elytra. These two forms likewise occur in Northern Asia and Europe, as well as three other named varieties.

Dysonycha pennsylvanica, *Illig.* (var. *limbicollis*, Lec.) was taken in great numbers from Polygonum hydropiper, which it had nearly defoliated.

Systena marginalis, *Illig.*, was beaten in great abundance from the dwarf oaks growing among the highest elevated rocks.

Xilophilus, n. s. About a dozen examples of this were taken at one time by bush-beating, but owing to their minuteness only two were found in the bottle, which contained many other insects. It is about half the size of *piceus*, which it resembles in colour, and in having a transverse basal impression on the thorax, though deeper; the elytra are deeply circularly impressed at base, giving rise to two tubercles well separated by the suture; the punctuation of the head and thorax is fine and dense, that of the elytra coarser; between each facet of the eye may be seen a clavate bristle, not extending beyond the facet. The first three joints of the antennæ and the tarsi are pale. The insect is piceous-black, finely cinereo-pubescent, .045 to .05 inch long, and may be called *tuberculifer*, to preserve it from the oblivion often incidental to such small things.

? Dryocœtes, *Sp.* This is probably the species cited in Packard's Forest Insects, p. 810, (5th Rep. U. S. Commission), as *Dryocœtes? affaber*, found by Mr. W. Hague Harrington in the cones of Pinus resinosa. This insect by difference of antennal club and tibial form does not appear to be a true Dryocœtes; neither by colour nor elytral striation and punctuation does it conform to Mannerheim's description of *affaber*. Examples were sent to Prof. A. D. Hopkins, of the West Virginia Experiment Station, for comparison with *affaber* as determined by Mr. Eichoff, who writes, "I have compared it with my examples of *Dryocœtes*, and find it quite a different thing from any of them; in fact, it differs so widely that I would pronounce it a new species. * * In the club of the antenna and tibia it differs from the other species so much that we might say it belonged to another genus." This species breeds in the cones of Pinus strobus, which grow to the length of 6 or 7 inches; the eggs are probably deposited in the young cones early in the season, the vitality of which becomes so much impaired by the larvæ that they drop to the ground when 3 or 4 inches long. Several of these collected the last week in July contained larvæ apparently full grown. Cones opened Sept. 10th contained the perfectly chitinized and maturely coloured beetles—20 or more in each. Therefore the pupa state must have been brief.

NEW NORTH AMERICAN HOMOPTERA.—NO. VI.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

1. AMALOPOTA FITCHI, *n. sp.*

Closely allied to *A. Uhleri.* Smaller; elytra smoky, about twice banded with white; nervures carmine, ocelli apparently wanting. Length, 6 mm.

Male: Vertex shorter and broader posteriorly than in *Uhleri*, hind margin very feebly emarginate, apex of the pronotum not advanced beyond the base of the lateral keels; frontal keel, viewed from the side, broader and more strongly rounded, with a more conspicuous notch at the base of the clypeus than in *Uhleri.* Antennæ ligulate, slightly narrowed at base, the sides thickened and parallel beyond, setigerous notch deeper than in *Uhleri.* Eyes very feebly emarginate below. Pronotum, viewed from above, less acutely angled before and exhibiting a slightly thicker edge than in *Uhleri*, the expanded sides subquadrate with rounded angles. Rostrum only attaining the apex of the hind coxæ. Elytra similar in form to those of *Uhleri*, the neuration nearly the same but with fewer apical areoles, these being ten in number from the tip of the clavus to the apex of the subcostal nervure; subapical areoles six, of which the first (outer) is large and oblong, the second small and triangular, and the third the longest; basal nervures four, long.

Colour pale yellowish-white, more obscure on the mesonotum and abdomen; sides of the face with a transverse carmine band between the base of the antennæ and the eye which is extended along the sides of the thorax where it becomes darker; abdomen sanguineous above, the genital segments brown. Eyes and tip of the rostrum black; antennæ reddish-brown, the thickened edges darker. Elytra blackish-fuscous; a basal elongated yellowish spot on the costa including the rounded elytral appendage; beyond this are two rounded dots, a broad transverse median band not touching the costa, and a large angular spot on the third and fourth subapical areoles sending a branch to the apex of the costa and another to the middle of the apical margin, whitish-hyaline; narrow costal area white with four brown spots, the stigmatal deeper and crossed at apex by a heavy carmine veinlet; nervures carmine-red, heavier about the stigmatal region, around the apex alternated with white; costa and a line on the commissure near the apex of the clavus, yellowish. Wings whitish-hyaline, with slender sanguineous nervures.

New York. Described from a single example beaten by me from a tree of the wild black cherry among the hills about twenty miles south of this city, on July 28th, 1892. This delicate little creature is a very interesting addition to our list of North American Derbidæ. Though quite distinct it is closely allied to the *A. Uhleri*, described in 1889, from Western New York specimens. (See CAN. ENT., Sept., 1889). The characters of genus *Amalopota*, founded by me for the latter species, must be somewhat modified for the reception of *Fitchi*, as in this species the ocelli seem to be wanting, while in the *Uhleri* they are quite distinct, though small and but poorly defined. This genus, though certainly valid, is very near *Anotia*, and forms a connecting link between it and *Otiocerus*.

2. CICADULA SLOSSONI, *n. sp.*

Form and ornamentation of *C. variata* nearly, but much smaller, with the vertex shorter and the black markings more elaborate. Length, 2½ to 3 mm.

Vertex ¼ longer on the middle than next the eye, blunter before and more rounded in both directions than in *variata*. Whole head much more deeply and coarsely punctured, the clypeus a little more narrowed apically, and the outer margins of the cheeks under the eyes shorter and more deeply excavated, with the outer angles more prominent than in *variata*. Pronotum distinctly transversely wrinkled, omitting the broad posterior margin which is closely punctured; in *variata* the pronotum is nearly smooth and more convex. Sides of the pronotum shorter, with the lateral angles more rounded and the latero-posterior edges more oblique than in *variata*. Last ventral segment of the female long, closely appressed over the base of the pygofers, the hind margin slightly waved, not distinctly notched on the middle as in *variata*. Valve of the male shorter than in *variata*, with the apical margin but feebly arquated; the plates longer and with their attenuated points longer and less recurved than in the larger species.

Colour: Head yellow; vertex with a large oval black spot on each side including a yellow dot and sending a branch anteriorly to the eye, apex with two large transverse black spots; about four broken arcs on the base of the front, a cloud beneath the eye, all the sutures of the face and the median line black, the latter expanded on the apex of the clypeus and the disc of the front. Antennæ dusky. Pronotum tinged with yellow anteriorly and marked with black along the fore border, and a double brown longitudinal median band widening on the hind margin.

Scutellum black, with the tip, the lateral margins anteriorly, and a median line reaching only to the transverse impressed line, yellow. Elytra white, dusky toward the apex, marked as in *variata*, with oblique brown bands forming a lozenge anteriorly, including a pale commissural spot, and an x posteriorly with the tip of the clavus as its centre, the median bands being common to both marks. These brown bands do not attain the costal margin, and are more strongly distinguished than in *variata*. Abdomen and pleural pieces deep black, the margin of the tergal pieces slenderly yellow, venter sometimes yellow with the segments and connexivum bordered within their margins with blackish. Legs brown, the joints and tibial spines pale.

New York; New Hampshire. Described from three examples; one male taken by me at Lancaster, N. Y., July 12th, 1889, a female taken at "High Bridge," New York City, in June, by Mr. E. B. Southwick, and a second female taken on the summit of Mt. Washington by Mrs. Annie Trumbull Slosson, to whom I take pleasure in dedicating this pretty little species as a slight tribute to her persevering devotion to the study of entomology.

3. CHLOROTETTIX NECOPINA, *n. sp.*

Form and size of *tergatus* nearly. Vertex with a black transverse band between the eyes. Colour above greenish-testaceous, marked and clouded with brown; elytra fuscous, with strong white nervures. Length, 7 mm.

Vertex a little more produced than in *tergatus*, and the front proportionately longer and narrower; ocelli contiguous to the eyes. Last ventral segment of the female thin, broadly and deeply cleft nearly to its base; this incisure at its apex armed with a small blunt tooth, the lateral lobes ovate, in one example feebly angled at apex. Pygofers stout, very slightly exceeded by the oviduct, and armed with a few stout brown bristles. Other characters about as in *tergatus*.

Colour: Beneath pale greenish tinged with testaceous, especially on the front, which is marked on the sides by about ten nearly obsolete brown arcs, and two brown dots are at the base of the clypeus; eyes dark brown edged with pale. Vertex with a broad transverse blackish band just behind the ocelli. Pronotum testaceous, pale before and on the median line, either side of which is a brown cloud, and a smaller one occupies the latero-posterior angle, transverse wrinkles less distinct than in *tergatus*. Scutellum marked with a piceous triangular spot within the

basal angles, the median line, a dot on either side, and the impressed line brown. Tergum fuscous, testaceous on the sides, the segment, edged with pale. Elytra fuscous-brown, nervures conspicuous, white, brown at apex. Wings smoky, iridescent, nervures brown. Legs pale testaceous, claws and tip of the rostrum piceous.

Mississippi. Described from two female examples kindly sent me by Mr. Howard Evarts Weed.

This very distinct species is quite anomalous in the genus in which I have placed it by its dark colouring and conspicuous markings, thus allying it with *Limotettix parallelus*. In most of its characters, however, it is closely related to *Chlorotettix tergatus*, near which it must be placed.

4. ATHYSANUS EXTRUSUS, *n. sp.*

Form of *A. variegatus*, Kirschb., broad and short; pale greyish-yellow, vertex with a transverse blackish band, elytral nervures pale. Length, 4½ mm.

Vertex longer and more pointed than in *obsoletus*, nearly ⅓ longer on the middle than next the eye; a broad transverse band on the disc and an angular spot at apex blackish, each bisected by the longitudinal median pale line. Face pale, front black with about eight pale arcs or pale with as many blackish arcs, sutures of the face and a double longitudinal line on the middle of the clypeus black; antennæ pale, set on a black cloud. Clypeus slightly narrowed to the truncated apex, its base arquated. Cheeks feebly angled without, exterior to the outer line of the loræ longitudinally wrinkled; tip of the rostrum black. Pronotum hardly longer than the vertex, mottled with dusky and showing four or five pale longitudinal lines, more or less obsolete; hind edge strongly concave, surface transversely wrinkled, broad anterior margin smooth and calloused; sides longer than in *obsoletus*, carinated; latero-posterior margins very oblique, almost continuous with the posterior margin. Scutelum with four or five brown spots, the posterior sometimes obsolete. Elytra short and broad, hardly exceeding the tip of the abdomen, pale, the areoles more or less heavily edged with fuscous. Abdomen brown or almost black, edge fulvous, with a few fulvous clouds beneath; pleural pieces brown, pale margined; legs pale, the femora banded with brown and the tibiæ dotted at the base of the spines. Valve of the male broadly triangular, apex obtuse; plates irregularly quadrangular, widely spreading, touching only at base; outer angles produced, subacute, armed with a few long bristles; inner angles rounded; styles very long, extending for

half their length beyond the apex of the plates, ligulate in form and curved downward and outward at apex; pygofers rounded at apex, almost equalling the plates, the small anal aperature placed superiorly.

New York; Connecticut. Described from three males. One taken at Portage Falls, N. Y., May 30th, 1888. The other two specimens were taken by me in Connecticut in the spring of 1883. One of these was swept from weeds and bushes on the hills about Northford, June 26th; the other, a very deeply coloured example, I found in a grove on Prospect St. in New Haven, June 4th. The long extruded styles of the males will at once distinguish this from any other of our described species of *Athysanus*.

5. ATHYSANUS INSTABILIS, *n. sp.*

More elongated than most of our species of this genus. Black, irrorated and finely marked with pale yellow. Elytra pale, the areoles edged with fuscous. Length, 4–4½ mm.

Head obtusely pointed before; vertex about ⅓ longer on the middle than next the eye, passage to the front well rounded, base with a few impunctured areas. Ocelli large, fulvous, distant from the eyes; temples broad; front convex, the sutures arquated at the antennæ and incurved at apex; clypeus feebly narrowed towards its slightly rounded apex; cheeks rather narrow, but feebly angled, not exceeding the clypeus. Pronotum rather long, with the sides long and carinated, latero-posterior edges straight, angles prominent, obtuse, surface strongly punctured or shagreened. Elytra long, with the appendix well developed. Valve of the male short, obtuse at apex; plates forming an equilateral triangle, fulvous clouded with dusky, their edges nearly straight, fringed with pale bristles. Last ventral segment of the female slightly produced and rounded on the middle, feebly arquated either side within the short subacute lateral angles; pygofers rather small, slightly exceeded by the oviduct.

Colour black. Base of the vertex, outer edge of the cheeks, and margins of the eyes slenderly yellow. Two transverse spots on the disc of the vertex near its base, two lines anterior to these, one or two dots near each eye, an angled slender line on the apex including a dot behind, a dot on the temples, about six arcs, a basal spot and a longitudinal line on the front, the latter expanded against the base of the clypeus, and

a spot on each lora, fulvous-yellow; disc of the cheeks with a pale cloud which sends a branch along the upper edge of the lora to the front. Antennæ black, base of the seta pale. Pronotum irrorate and narrowly edged with pale, with a few irregular yellowish marks along the anterior border. Middle line of the scutellum, a curved mark either side of this on the basal field and the margins yellow, the latter interrupted at their middle. Narrow edges of the abdominal segments and the spines of the pygofers pale. Femora with a fulvous band; hind tibiæ yellow, dotted with piceous, the spines and claws whitish. Elytra soiled white, smoky at tip, nervures concolorous broadly bordered with fuscous, the costal and commissural pale.

Michigan; Colorado. Described from one male and three female examples taken at Agricultural College, Michigan, by my friend Mr. G. C. Davis, and another female received from Prof. C. P. Gillette, taken in Colorado.

This insect is nearly allied to the species described by me as *Athysanus striatulus*, Fall. (?), in Ent. Am., vi., p. 134, like which it has a well-developed elytral appendix. Two of the specimens before me have a second transverse nervure between the first and second sectors of the elytra, thus allying them to *Deltocephalus*, but for the present it seems better to place them in genus *Athysanus*.

Our described North American species of *Athysanus* may be arranged as follows:—

A. Stout species with a short vertex and abbreviated elytra, without an appendix:—

1. *A. obsoletus*, Kirch. 2. *A. extrusus*, Van D. 3. *A. comma*, Van D. 4. *A. plutonius*, Uhler.

B. Smaller, more elongated species, with more produced subconical heads and longer elytra without an appendix:—

5. *A. Curtisii*, Fitch. 6. *A. bicolor*, Van D. 7. *A. obtutus*, Van D.

C. Species similar in form to those of the last section, but with a shorter head, flatter vertex, and longer elytra with a well-developed appendix:—

8. *A. instabilis*, Van D. 9. *A. striatulus*, Fall. (?).

NOTES ON A POLYMORPHIC BUTTERFLY, SYNCHLOE LACINIA, GEYER (IN HUB. ZUTR.), WITH DESCRIPTION OF ITS PREPARATORY STAGES.

BY W. H. EDWARDS, COALBURGH, WEST VA.

"Godman and Salvin, Rhopal. I., p. 177, 1882, under the specific name *Lacinia*, place *Saundersii* and *Tellias*, Bates; *Quehtela* and *Ardema*, Reakirt; *Paupera*, Felder; *Mediatrix* and *Misera*, R. Felder; *Pretoria*, Boisduval; *Crocale*, Edwards; *Adjutrix*, Scudder, and *Adelina*, Staudinger; all of which they consider but inconstant forms of one species. From their works we quote: 'Between these extremes, *Adelina* and *Saundersii*, every gradation of colour can be traced, and all the rufous markings, as well as the yellow ones of the under side, can be exhibited in different individuals from their maximum development till they vanish altogether. . . . In the Southern States of North America, a form occurs which is very like *Saundersii*, and is prevalent in Texas. This is *Adjutrix*, Scudder, but we doubt the possibility of maintaining its distinction. In Arizona another form occurs, *Crocale*, Edw., which we take to be undistinguishable from *Adelina*, and therefore connected with the whole series.'" Quoted from E. M. Aaron, in Papilio IV., p. 177, in his paper entitled List of a Collection of Diurn. Lepid. from Southern Texas. Mr. Aaron adds: "Among these Texas captures were *Saundersii*, *Adjutrix* and *Mediatrix;* the latter two were taken in copulation."

I have not access to the works of Godman and Salvin, but Dr. Skinner informs me that they figure eleven forms of this species, and its localities extend even to Peru and Bolivia. These authors based their opinion as expressed not at all, so far as appears, from rearing the larvæ. Indeed, until recently, no one seems to have been acquainted with any of the preparatory stages, not only of *Lacinia*, but of any species of the genus *Synchloe*. In 1892, Prof. Packard sent me in a tube with alcohol an adult larva and pupa, received by him from Prof. Tyler Townsend, of Las Cruces, N. M. In 1893, by the aid of Mr. T. D. A. Cockerell, also of Las Cruces, I have been able to study all the stages from egg to pupa. He wrote 7th July: "I saw a black and white butterfly, rather like a small Limenitis (was it not Synchloe *Crocale?)* settle on two or three leaves of a sunflower." On 26th July: "Yesterday, Prof. Owen took me to his ranch, a short distance from Las Cruces, and I got there some *Crocale* larvæ, which I send herewith. I find that the young are gregarious, feeding as closely as they can stand on the upper side of a leaf of

Helianthus, which they skeletonize, instead of devouring the whole thickness, as older ones do. They remind me of the young larvæ of Vanessa *Urticæ*. The older larvæ I send are of a red variety. The larvæ are trimorphic, with forms as follows:

1. *nigra*, a black form.
2. *bicolor*, black with broad red dorsal stripe.
3. *rufa*, red form."

Again: "The Helianthus appears to be the common H. annuus. One finds several larvæ (adult) on one plant. Each has a leaf to itself, and they select the large leaves, not the young tops. They rest on the middle of the leaf, feeding by day, exposed to the sun. They must be inedible to birds, as they are very conspicuous. They gnaw holes out of the middle of the leaf. I could not see that they make any sort of web, and when alarmed they drop to the ground. At one place I found three or four, all black. One larva found on a narrow-leafed composite (not in flower) was about to pupate. It may have wandered from a sunflower, though there was none nearer than several yards. It was pupating quite exposed on the leaf."

On July 29th: "Yesterday, I found some batches of larvæ about one-half grown, still gregarious, and for the most part on the under side of the leaves. One batch was entirely of black larvæ, but another, to my surprise, contained all the variations mentioned in former letter. In the majority of cases a brood is all of one colour, but at least sometimes the three colours may all appear in one brood. I also enclose a *Crocale* butterfly which was caught and killed by a large Asilid fly (Proctacanthus Philadelphicus, Mocq.)"

Aug. 27th: "Yesterday I was in Juarey, Mexico (across the river opposite El Paso), and got a lot of insects. Among them both typical *Crocale* and the orange-shaped *Adjutrix*, as also a very pretty aberration, *rufescens*. I send all these herewith, as also what I call ab. *nigrescens*, an unusually black form of *Crocale* proper, which I bred here in Las Cruces."

There came two labelled *rufescens* and considerably unlike. One has a broad red band across both wings reaching nearly to costa of primaries, with marginal red spots on both wings; the other has the red band on hindwings one-half wider than usual and of deep colour, but there is nothing of it on forewing, nor are there marginal red spots. Both these varieties, I doubt not, have received species names. The bred *nigrescens*

has the spots that compose the white mesial band on hindwings reduced to mere streaks of white on the nervules. No doubt this has received a species name. But one of the Juarey examples is plainly *Ardema*, of Reakert: "hindwings black, with an indistinct orange-brown shade across the disk."

Mr. Cockerell wrote 9th Sept.: "On the college farm, yesterday, I found a batch of Synchloe eggs on the under side of a sunflower leaf. They are like the eggs I sent before. They are like the eggs of Melitæa, as figured by you in Butt. N. A. Synchloe seems to be practically a Melitæa in its earlier stages. I send one example of larva, black with numerous yellow-white dots, a sub-variety of the black type. I found several such."

During the season I had also received several batches of larvæ of Phyciodes *Carlota*, from Montana, and eggs of same from Colorado, and the larvæ from the *Crocale* eggs were reared at same time with the others, so that I was able to compare the two species step by step. The eggs of the two are in no way distinguishable, nor are the larvæ in the first two stages; as regards shape and armature they are alike in the succeeding stages, but differ in coloration. But the pupa of the Synchloe is not like that of *Carlota*, which is of the typical Phyciodes shape and appearance, and like *Tharos*, but is closely like the pupa of Melitæa *Baroni*, as given in Butt. N. A., Vol. III., pt. 3. The stages are described as follows:—

Egg.—Similar to Phyciodes *Tharos:* obovoid, truncated at top, rounded at bottom, the lower three-fifths, or about that, examples varying, covered with irregular shallow indentations; the upper part ribbed, about twenty-four ribs, not much elevated, not sharp, the interspaces roundly and shallowly excavated; top slightly depressed; colour when first laid pale green, later changing to green-yellow. Laid in close clusters side by side in several rows. In the cluster under view each complete row (4) contained just nine eggs, and there were shorter rows on either side of these; on the top was part of another layer, placed irregularly and more or less on their sides. These eggs were believed to have been laid 8th Sept., or on the day when found, and hatched on 15th, or after six days.

Young Larva.—Length at one day from egg, .06 inch; cylindrical, even, each segment well rounded; furnished with many tapering black hairs, or processes, of which those on segments 3 and 4 are in cross line on the middle, four on either side above the spiracular line; on 2 is a black oval chitinous patch on top of dorsum, on which are six shorter

processes in line, and another on each side just below the patch; also two others in vertical row to the front and opposite the spiracle, on segments 5 to 12 inclusive six processes, three on either side, arranged in triangle as usual in the family; on the front of 13 are six in cross line, and the triangle on either side to the rear; along base of body one similar short process over each foot, two on 5 and 6 each, and one each to the remaining segments up to 12, in addition to which is a still shorter process over base of each proleg, and on 5, 6, 11 and 12 below the other; colour green, with a brown tint; head scarcely broader than 2, obovoid, slightly bilobed, shining black-brown, with scattered short processes over the face like those of body. Duration of this stage three days.

After first moult: Length at one day, .1 inch; colour variable, some examples being light brown with a green tint, some of brown of darker shades; the spines as in Phyciodes, rather short, slender and tapering, glossy black, with short bristles about them at a small angle, and rising from shining black tubercles; head cordate, glossy black, with many curved processes on the front. Duration of this stage, three days.

After second moult: Length at one day, .14 inch; colour variable, some larvæ being wholly black, some rust yellow, some of this last have on dorsum and lower half of side, a dark brown sub-dorsal band intervening; the spines rather longer in proportion than before, otherwise similar; head as before. Duration of this stage, three to four days.

After third moult: Length at one day, .3 inch; shape and spines as before; the colour as before, but the russet more red, and on those which are wholly russet are two black cross lines to each segment, one on the rear, the other at the junctions; head as before. To next moult, about four days.

After fourth moult: Length at one day, .52 inch; variable as before, the rust colour deepened into red-fulvous. At about six days was full-grown.

MATURE LARVA.—Length, .1 to 1.2 inch. Cylindrical, even; colour very variable, some being bright red-fulvous; at the junction of the segments a stripe of glossy black, and on 4 to 10 inclusive a narrow, dull black stripe near the rear of each; under side greenish-brown, as is also the front of 2; on the middle of 2 a dorsal chitinous collar, on which are six small spines, three on either side the mid-dorsal line; a little below these another; a long spine below the spiracle; the spines on the succeeding segments arranged as in Melitæa, black, shining, not long in pro

portion to the size of the body, rising from shining black tubercles, tapering to an irregular top, and surrounded by many short black bristles set at a small angle; head cordate, black, glossy, with many tapering hairs or processes on the face. Other examples are yellow-fulvous; others have a continuous red-fulvous band on dorsum, rather wider than the tubercles of the dorsal row of spines; or this band is macular, a rectangular spot being on each segment, bearing the spine; the lower part of side is also red-fulvous, and the intervening space is dark-brown, forming a sub-dorsal band the length of the body. The red on dorsum is sometimes reduced to a small patch on each segment, on rear. Others are black throughout, except that over the upper part are specks and minute spotes of white or yellowish; others are black, but from the second lateral row of spines to basal ridge is a band of greenish-white and black, mottled, and sometimes the upper edge of this band shows a macular fulvous line. In all, the spines are black. There are at least three distinct types of larva:

1st.—All red- or yellow-fulvous.

2nd.—The dorsum and lower part of side fulvous; the subdorsal area dark-brown.

3rd.—All black, or black with a greenish band on side.

From fourth moult to pupation, about seven days.

CHRYSALIS.—Length, .45 to .52 inch ♂; .55 to .64 inch ♀. In an example of which the length was .52, the breadth both at mesonotum and abdomen was .2 inch; cylindrical, shape of Melitæa; head case short, narrow at top, and a very little incurved, the sides excavated; mesonotum rounded both ways and rising to a slight prominence on the rear, but not carinated, followed by a slight depression; abdomen conical; the wing cases somewhat elevated, bevelled down to the abdomen on the margin; colour the first day white, pink-tinted, then becoming ivory-white, specked and spotted with black, with some black bands or stripes; a stripe across the top of head case, a band from end to end on the ventral side; some spots on the head case; on mesonotum two spots in front, two on rear, one on either side (at the tubercle); in some examples these are mere points, but in others large, and form a ring around the middle of the mesonotum; on the abdomen a black crescent on the anterior side of each tubercle; on middle of wing case a bent bar, two patches at hind margin, and several dots; the tubercles correspond to the spines of the larva, and are low, conical, orange. But there is great

variation in the size of the black marks, and there is every grade to a nearly black pupa, black marked with white. No two of the melanic examples were alike. Duration of this stage, five to seven days. By the above, it will appear that the pupæ also are polymorphic, some being almost wholly white, some almost wholly black, with all sorts of intergrades.

These resulted from the pupæ reared in July and August imagos which came out between 2nd August and 19th :—

1st.—From all red larvæ.....3 orange banded, or *Adjutrix*
8 white banded, or *Crocale*

2nd.—From all black larvæ.....15 .....*Adjutrix*
3 .....*Crocale*

From pupæ of the succeeding brood of larvæ, the imagos out between 29th August and 8th September :—

1st.—All red larva.....4 .....*Crocale*

2nd.—All black larvæ.....2 .....*Crocale*
4..... .....*Adjutrix*

3rd.—Red backed larvæ.....13..... *Crocale*
3..... .....*Adjutrix*
1 with a very slight orange tint.
1 very red and broad band.

The last brood of larvæ of the year, out of eggs hatched Sept. 15th, hibernated after third moult early in October. As this is exactly the habit of the Phyciodes (as *Nycteis* and *Carlota)*, we may assume that the larvæ on their waking up early in spring, (Feb. or March, no doubt, at Las Cruces), would be in pupæ within two weeks thereafter, to give imagos a few days later. Probably, therefore, the butterflies are on the wing by April, and thereafter a brood will appear at least monthly. If this is so, the first larvæ received by me, in July, would have come from the third generation of butterflies of the year. This generation, from 29 pupæ, gave 18 *Adjutrix* imagos to 11 *Crocale*, or 62 per cent. *Adjutrix*, and 38 per cent. of *Crocale*. The following generation, from August larvæ, out of 28 pupæ gave 19 *Crocale* to 9 *Adjutrix* (including all red-banded), or 68 per cent. *Crocale* and 32 *Adjutrix*. The proportions in the two generations were nearly reversed, and as the season goes on there would seem to be a tendency to produce the white banded form. It will be of interest to watch the outcome of the hibernating larvæ, and I hope by Mr. Cockerell's aid next season to learn which form prevails in the two or three earliest generations.

As I am correcting the proof of this paper, I can add from a letter of Oct. 21st, from Mr. Cockerell ;—"The Synchloe is still flying here in fair numbers. I find that in a state of nature the larvæ hibernate gregariously in the dead, curled up leaves of the sun-flower.

ON A SEEMINGLY MICROLEPIDOPTEROUS LEAF-MINER OF THE NARROW-LEAFED COTTONWOOD.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA, W. I.

In the same leaves of *Populus angustifolia* in which were found the tenthredinid (lepidopterous?) leaf-miners,* in the Canada Alamosa, northern Sierra county, N. Mex., in June, 1892, there were also found specimens of a very distinct leaf-miner. It bears a striking resemblance to the leaf-miner of the vine found in the Mesilla valley of the Rio Grande. It possesses the sucker-like mouth of that miner. After being mounted in glycerine on a slide for several days, however, the outer portion of the distended sucker-like organ became transparent, exposing within what appear to be two stout rounded mandibles with teeth on their inner edges.

Since this miner is footless, and yet possesses toothed mandibles, I infer that it is microlepidopterous. It mines on the lower side of the leaf, not being visible from above.

Description of miner.—Length, 3½ mm. Colour entirely white. Whole larva fleshy, consisting of thirteen segments. Widest anteriorly, narrowing posteriorly. Segments laterally rounded, the anterior ones especially projecting on sides, the body being laterally deeply incised at sutures. Head rather triangular in shape, running to a blunt point anteriorly, widest behind—where it is less than ⅔ the width of prothoracic segment. Anterior end of head terminated with a sucker-like organ distally distended, constricted at base into a neck-like junction with the head, enclosing and concealing a pair of apparently corneous jaws or mandibles. Mandibles are a little longer than wide, rounded-oblong, furnished on inner edge with three recurved or posteriorly directed teeth. Antennæ springing from anterior lateral edge of head just posterior to the neck-like constriction of the sucker-like capsule which encloses the mouth-parts. The antennæ are apparently 4-jointed, but possess some supernumerary bud-like joints. First two joints about same length, the basal one slightly thicker; third joint less than half as thick and shorter than second, accompanied by two slender bud-like or tooth-like joints which spring from the second joint and are shorter and narrower than third joint. Fourth joint a little shorter and smaller than third, about size of the supernumerary joints just described, accompanied by a shorter super-

*See article "Another leaf-miner of Populus," in Journ. N. Y. Ent. Soc., Vol. I.

numerary joint which is terminated by a bristle. Eyes situated immediately behind base of antennæ, on outer edge of head, appearing as a black dot with three other dots in a row behind. Prothoracic segment widest; mesothoracic and metathoracic segments about same width, and a little narrower; segments 5 to 7 about equal, and much narrower than thoracic segments; 8 to 11 successively and gradually narrowing, 12 a little longer than 11; 13 widened, especially posteriorly, narrowing anteriorly, incised on lateral edge. All the segments nearly the same length, the posterior ones more elongate for their width, head longer than prothoracic segment. Surface of body very thinly clothed with a few fine moderately long hairs, some on head. Feet and legs entirely absent.

Described from an alcoholic specimen in a glycerine mount. A second specimen, about the same size, has the segments more approximated, body hardly as tapering posteriorly, lateral incisures hardly as deep, and the anal segment not widened. It is, perhaps, the same species. Canada Alamosa, June 17.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held in its rooms in Victoria Hall, London, on the 11th and 12th of October, the vice-president, Mr. J. M. Denton, occupying the chair in the absence of Mr. Harrington, the president, who was unfortunately unable to be present. The reports of the treasurer, librarian and curator, the council, the botanical, ornithological, geological and microscopical sections were read and approved Several interesting papers were read and addresses delivered. A number of rare and remarkable specimens were exhibited. Full reports of the proceedings will be published in the forthcoming annual report to the Legislature of Ontario.

The following gentlemen were elected officers for the ensuing year:—

President—W. Hague Harrington, Ottawa.

Vice-President—J. Dearness, London.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors—Division 1—James Fletcher, F. L. S., F. R. S. C., Ottawa.
" 2—Rev. C. J. S. Bethune, F. R. S. C., Port Hope.
" 3—Gamble Geddes, Toronto.
" 4—A. H. Kilman, Ridgeway.
" 5—R. W. Rennie, London.

Librarian and Curator—J. Alston Moffat, London.

Editor of the CANADIAN ENTOMOLOGIST—Rev. C. J. S. Bethune, M.A., D. C. L., Port Hope.

Editing Committee—J. Fletcher, Ottawa; H. H. Lyman, Montreal; Rev. T. W. Fyles, South Quebec; J. M. Denton and J. H. Bowman, London.

Delegate to the Royal Society—Rev. T. W. Fyles, South Quebec.

Committee on Field Days—Dr. Wolverton, Messrs. Clement, Elliott and Stevenson, London.

Auditors—J. H. Bowman and J. M. Denton, London.

HYBLŒA PUERA, CRAMER.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

Mr. Butler (P. Z. S., 1892, p. 133) remarks concerning the *Hyblæidæ* (*Hyblæinæ*, I would rather write) as follows:—

"The position of this family is somewhat doubtful; the aspect of the species forcibly reminds one of the Tortrices, but the neuration does not altogether correspond with that of the *Tortricidæ*; at the same time the *Hyblæidæ* do not appear to be true Noctuites." How this may be, I cannot venture to judge, but *H. puera* is very common in Kingston, Jamaica, and as I have bred it, a description of the larva may help to decide the question.

Larva: about 19 mm. long, rather reminding one of the *megacephala* group of *Acronycta*. Body cylindrical, with sparse hairs of moderate length Head shining pitchy-black Body black above, with a more or less interrupted red dorsal stripe; and very narrow subdorsal white stripes, much broken into spots. The black continues as far down as the spiracles, but just above the spiracles is another broken white line, like the subdorsal. There is a narrow yellowish-white band along the lower margin of the black, and below this the body is marbled with grey and pale reddish-brown, a small hair-patch below each spiracle being ringed with white. Abdominal legs pale brown. Thoracic legs shining red-brown. The first 3 and the last body-segments are almost entirely black beneath. Lives in curled-up leaves of *Catalpa*, in which it pupates.

Pupa bright red-brown.

Larva and pupa found in Kingston, May 3, 1892. Three moths emerged on May 10.

Mr. J. J. Bowrey has briefly referred to the larva in Handbook of Jamaica, 1881, p. 118. Moeschler, in his Porto Rico work, says the larva is found on *Crescentia* and *Tecoma*. The distribution of the insect is extraordinary—West Indies, Brazil, Java, Ceylon, Nepal, China, S. Africa, Madagascar, Mauritius, etc.

BOOK NOTICES.

EXPERIMENTAL FARMS: REPORTS FOR 1892. Printed by order of Parliament: Ottawa, 1893.

This valuable "Blue-book" has been before us for some time, having been distributed in April last, but various circumstances have prevented us from noticing it and several other publications, for which we are indebted to the courtesy of the authors. Our readers will, of course, be chiefly interested in the report of Mr. James Fletcher, the Entomologist and Botanist of the Central Experimental Farm at Ottawa, which occupies twenty-four pages of the volume. After mentioning the chief insect attacks of the year, Mr. Fletcher gives an interesting and valuable account of the life-histories of the Hop-vine Borer (*Hydræcia immanis*, Guén.), the Red Turnip-beetle (*Entomoscelis adonidis*, Fab.), the Western Blister-beetle (*Cantharis Nuttalli*, Say), and the Birch Bucculatrix (*B. Canadensisella*, Chamb.); in these there is much new and original matter, as well as a summary of the previous observations of others. The identification of the hop insect, which is also called, from its mode of attack, the "Collar-worm of the Hop," is particularly interesting. Its injuries have been observed for more than twenty years, but it was a long time before the moth was reared from the destructive larvæ and its identity established. The most effective remedy for this insect appears to be the encouragement of the unsavory skunk in the hop-yards; in the northern part of the State of New York and in Wisconsin, this animal has been found most useful from its habit of digging round the infested plants and devouring the worms. The turnip and blister-beetles referred to have been very destructive in the Northwest Territories, the latter attacking the Windsor Bean, while the Birch Bucculatrix has infested the trees in the neighbourhood of Ottawa. Mr. Fletcher also describes several useful parasites which serve to keep in check the currant and willow saw-flies and other injurious insects. The remainder of his report is devoted to an account of the potato-blight which affects the leaves of the plant, and the potato rot affecting the tubers, and a chapter on lawn grasses and fodder plants.

CATALOGUE OF THE LEPIDOPTEROUS SUPER-FAMILY NOCTUIDÆ FOUND IN BOREAL AMERICA: By John B. Smith, Sc. D.: (Bulletin No. 44 of the United States National Museum). Smithsonian Institution, Washington, 1893.

This volume of four hundred and twenty-four pages will be heartily welcomed by every student of the Noctuidæ of North America. It is not a mere list of species, but a complete bibliographical and synonymical

catalogue. The authority, date and reference are given for each genus, and under each species are given the date, author and place of publication of the original description, followed by any other published references, the synonymy, habitat, and where the type can be found. Anyone who has attempted to keep a record of the published references to our Lepidoptera—and we have all been compelled to do so in some form or other—will appreciate the immense amount of labour that Prof. Smith has performed in the preparation of this work, and must feel heartily grateful that he has now relieved us of a task that few are competent to accomplish satisfactorily. The saving of time, and the satisfaction of knowing that one is not now likely to overlook anything that has been published regarding a species, are no small boons to the student. For a full explanation of the origin and purpose of the work, we must refer the reader to Prof. Smith's somewhat lengthy preface, which will be found well deserving of careful perusal. The general index at the end of the volume makes the work complete, and we have no hesitation in saying that it is the most useful publication on the North American Noctuidæ that has yet been issued from the press. We trust that the author will before long be able to lay us under still greater obligations to him by the publication of his contemplated monograph of the whole of this family of moths.

CORRESPONDENCE.

CORRECTION.

Sir,—In my last paper, "Washington Tenthredinidæ, etc." I find that I have made the following mistakes:—Page 238, line 13 from top, 23 from top, and page 239, line 6 from bottom, the word *labium* should in each case be *labrum*. A. D. MacGillivray.

CALLIDRYAS EUBULE.

Sir,—On the 5th of October last I observed a bright yellow butterfly, much larger than any of our species of Colias, flying in the street here, but it soon passed out of sight over some houses. On the 9th inst. I observed some others, and at last succeeded in capturing what proved, to my great delight, to be a specimen of *Callidryas Eubule*, the first taken in the State of Iowa. Hitherto it has not been seen north of Missouri; though I have collected in this State for ten years, I have never met with this butterfly before, but now I have taken no less than four specimens, all females, and so fresh that they look as if they had just emerged from the chrysalis. Keota is built upon "the divide," and is ten miles either north or south from any heavy belt of timber, or any large stream of water. These specimens must therefore be "wind-visitors," as Mr. Grote terms them, and have been wafted here by the air-currents from the south. A. S. Van Winkle, Keota, Iowa.

Mailed November 4th.

The Canadian Entomologist.

VOL. XXV. LONDON, DECEMBER, 1893. No. 12.

NOTES ON THE OCCURRENCE OF HEPIALUS THULE, STRECKER, AT MONTREAL.*

BY H. H. LYMAN, M. A., MONTREAL.

In the part of Mr. Strecker's Lepidoptera, Indigenous and Exotic, dated Feb. 22nd, 1875, is the description, and on the accompanying plate an excellent figure, of this species from a female sent to that author by the late Mr. Caulfield, and which was probably taken in the previous summer. The specimen was found in Phillips Square, which is about two miles from its nearest known locality, by the caretaker, from whom it passed to the taxidermist of the Natural History Society, who gave it to Mr. Caulfield.

From that time I can find no further record of its capture till that given in the Feb., 1884, number of the CANADIAN ENTOMOLOGIST (Vol. XVI., 39), by the late Mr. Bowles, who recorded having received a specimen of it during the previous year, 1883. He also stated in the same note that Mr. J. G. Jack, of Chateauguay Basin, P. Q., had also a very beautiful specimen of this moth, presumably taken in that locality.

In 1889, when looking into this matter, I wrote to Mr. Jack, at Jamaica Plain, informing him that I had found it recorded in the old minute book of the Montreal Branch that he had found the larva of what was probably a large species of Hepialus at Chateauguay, and asking him for particulars about this matter, and especially whether he had ever succeeding in rearing the larva to imago, or had taken this species there, and mentioning what Mr. Bowles had published in 1884. To this letter Mr. Jack replied that for two or three years in succession he had found a larva which he believed to be a Hepialus in the stems of Acer Spicatum, and one in a stem of A. Rubrum, and another in that of A. Pennsylvanicum; that the stems in which they were found were from one to two inches in diameter; that the borings extended from about a foot above the surface of the ground down into the rootstock, and that the point of exit

* Read before the meeting of the Entomological Club of the American Association for the Advancement of Science, at Madison, Wisconsin, August, 1893.

was usually but a few inches above the surface of the ground ; that the larvæ were searched for and found in late fall or early winter, and that though about a dozen were found he did not succeed in breeding the imago ; and finally that he never took *H. Thule* anywhere, but exchanged with the late Mr. Shaw, of Montreal, for a nice specimen which he afterwards gave to the Museum at Cambridge, Mass.

No further specimens, so far as I have been able to ascertain, were taken till 1885, in which year Mr. Shaw was so fortunate as to secure nine specimens. Mr. Shaw, to the great regret of our members in the Montreal Branch, died in 1886, and I was therefore unable to learn any further particulars from him.

In 1887 I searched in vain for the species, but in 1888 I was successful in discovering it, and took twelve specimens.

The locality where I discovered it, and which was probably the same as where Mr. Shaw had found it, is the brow of the old sea terrace of the post-pliocene period which extends for some miles east and west of Montreal, at a point in the municipality of Côte St. Antoine on the western outskirts of Montreal, and just above the St. Henry Swamp. I only found it in a very limited portion of this locality, not more than 400 or 500 feet in length, and supposed it was restricted to this very small area.

In 1889 I only secured six specimens, though I visited the locality much oftener, and in 1890 one just before starting on a trip across the continent, while in 1891 I only obtained two, and one other was taken by Mr. Winn.

From these facts I feared it was doomed to extinction in this locality, as the Canadian Pacific Railway runs along the brow of the terrace, and the swamp at its base is being drained and cultivated, and will be built over in a few years.

But last year we learned from one of our members that he had taken the species about three miles further west, but on the level swampy tract below the terrace, and some of our members went out on 15th July and two specimens were secured. This year Mr. Winn has traced it out all along this terrace, so that its range is much more extensive than we supposed.

The earliest date upon which I have taken it is 6th July, and the latest upon which I have heard of its being taken is 20th July of this year, but the specimens were worn and ragged.

The species seems to fly only for about fifteen to twenty minutes in

the twilight, as I have never taken it before ten minutes past eight, nor ever after half-past eight. Bright, clear evenings I have found much more favourable than cloudy ones, though I have visited the locality on many evenings without seeing one.

I have never succeeded in seeing where they came from, though I have stood watching intently for them for fifteen minutes or more before they appeared, but suddenly two or three would be in the air together, often out of reach of the net, swinging back and forth in their peculiar oscillating manner, though single individuals have been taken by others while flying along near the ground.

If touched by the net without being caught, they would drop into the grass apparently quite helpless. Six-sevenths of those which I have taken were males, but others have secured a more even division of the sexes.

One of the specimens taken in 1891 was a female, which I kept alive in order to secure eggs. It laid freely an enormous number, and I do not know whether it might not have laid more had it been kept alive longer. It was kept alive for two days in a wooden box, with gauze over the top, and seemed to hang perfectly quiet and to allow the eggs to run from her, as they were not attached, but loose in the bottom of the box. At the end of this time she was found to have been knocking about and spoiling her wings, and so was killed. The eggs were counted very carefully, and were found to amount to the enormous number of 2,151.

The following description was taken :—

Length, .027 of an inch.

Breadth, .022 of an inch.

Even oval, slightly flattened on lower side, perfectly smooth, but dull, like unglazed porcelain.

Colour, a pale honey-yellow when laid, soon turning black.

This female, however, must have been virgin, as the eggs speedily shrivelled, so that I was unable to obtain the young larvæ, or to make any of the experiments which I had contemplated in the direction of placing the eggs upon any likely food-plant. In connection with this subject several questions of great interest arise. It is well known that the moths of this family are very abundant in the Old World, one especially, *Hepialus Velleda*, swarming in Scotland in myriads, yet though we have a great many species on this continent, I do not think that any one can be considered other than very rare, except *H. Mustelinus*, which Packard reported (Proc. Ent. Soc., Phil., III., 394), as not uncommon at

Brunswick, Me., at light, and *H. Argenteomaculatus*, which is stated to be pretty generally distributed, though it is certainly not common in the imago state.*

Now, if the females in this genus produce over two thousand eggs each, it can be easily understood why they are so abundant in Europe, but why are they so rare on this continent?

Mr. D. S. Kellicott, who discovered the larva and pupa of *H. Argenteomaculatus*, found that that species bored in the roots of Alnus incana, but came up into the stem when mature, and Prof. J. B. Smith stated that it bred also in oak, willow and poplar. Mr. Kellicott stated in his paper upon this subject, which he read before this club at the Cleveland meeting, that after these nearly mature larvæ had come up into the stem, large numbers of them were destroyed by woodpeckers.

Upon reading this, it occurred to me that possibly this furnished the key to the mystery of the scarcity of these moths on this continent, and I therefore wrote to an ornithological acquaintance to ask if woodpeckers were more abundant on this continent than in the Old World. This gentleman replied that while he had no definite knowledge upon that question, he should judge that we had in Canada ten to twenty times as many woodpeckers to the square mile as they had in England.

I must, however, confess that even if this estimate be correct it is not an entirely satisfactory explanation, as there are on this continent a number of small species in this genus which no doubt feed in the roots of shrubs or herbaceous plants where woodpeckers would not be likely to find them, which are quite as rare as the larger species. I also wrote to Dr. Strecker to learn whether, so far as he knew, Thule had ever been found in any other locality than Montreal, to which he replied as follows:—"Some years since, an example of *Hepialus Thule* was taken somewhere in Wisconsin, I don't recollect where or by whom, but a sketch was sent me at the time for identification, which I immediately recognized as that species."

In regard to the life-history of the species in this genus, the English entomologists to whose works I have access are extremely vague. Stainton, in his Manual I., 109, says of the genus, "Larva feeding on the roots of plants," which leaves it very indefinite as to whether he means in the roots or tunneling in the earth and feeding on the roots. He even says that the larva of H. Hectus feeds on the leaves of dandelion, and F. O. Morris says "on the dandelion." Newman, "British Moths," does not commit himself as to Hectus, but of most of the others he says "on roots," but of H. Velleda he says "in thesubterraneous rhizome of the common brake, *(Pteris aquilina)*."

In spite of the very loose statements of English entomologists, I think there can be no doubt that the larvæ of this genus are internal feeders, as stated by both Harris and Packard.

*Since writing this paper Prof. J. B. Smith has called my attention to the fact that *H. McGlashani* is very abundant. See Ent. Amer., II., 15.

ON SOME UNDETERMINED BOMBYCES.

BY HARRISON G. DYAR, NEW YORK.

THIA (THELETHIA) EXTRANEA, Hy. Edw.

Mr. Andrew Bolter, of Chicago, has kindly sent me the type of this species for examination. It proves to belong to none of our families of Bombyces, as I had suspected. (See Journal N. Y. Ent. Soc., I., 98). On comparing the venation with *Pseudanaphora arcanella*, Clem.,* I find it to be essentially the same, differing only in details. Vein 2 of the secondaries is more remote from vein 3 in Thia than in Pseudanaphora, the lower fork of the discal vein ends between veins 4 and 5 instead of at origin of vein 4, and veins 5 and 6 arise from a common point instead of being well separated. Vein 8 (costal) present in both, strong, distinct, free, not 'apparently none.' On the fore-wings the venation is very similar in both. The second internal vein (submedian) is weak ; the first strongly furcate at base. All the venules free, unbranched. Subcostal vein very remote from the costa, all closely as in Pseudanaphora.

The fore-wings of this little moth are closely and heavily scaled above, glossy black ; below of a gray brown, the veins slightly discolorous, the costa and fringe black. Hind-wings nearly hyaline, with but a few scattering scales ; the fringe well developed, black.

Body parts black, the tongue pale, contrasting.

As the name Thia has been used before in entomology, the present Tineid genus may be known as *Thelethia*.

CISTHENE (CLEMENSIA) LACTEA, Stretch.

Mr. Beutenmüller has discovered a specimen of this species in the Edwards collection, without label. So far as I have been able to examine it, it does not violate the characters of Cisthene, but its coloration is so different from the other species of the genus that I would prefer to place it in Clemensia, with which it agrees perhaps equally well structurally.

PSEUDOPSYCHE (OEDONIA) EXIGUA, Hy. Edw.

According to the present arrangement, the synonymy of this species is as follows :—

Family, PSYCHIDÆ.

Genus, OEDONIA, *Kirby*.

*Determined by Prof. C. H. Fernald,

1893, Kirby, Cat. Lep. Het., I. 524.

|| *Pseudopsyche*, Hy. Edw.

1882, Hy. Edw., Papilio, II., 124.

O. EXIGUA, *Hy. Edwards.*

1882, Hy. Edw., Papilio, II., 125.

No characters have been published which would allow of giving the genus *Oedonia* a family location. Its reference to the Psychidæ is probably due to its colour only. The statement that the pectinations of the antennæ are furcate at the tips I am unable to verify, and I regard it as erroneous. The other characters which have been given are general ones.

I have examined Mr. Neumoegen's specimen, by the kind permission of that gentleman, and present my notes on the venation, as they may be of assistance to some one :—

Primaries.—Vein 1 free, straight, simple, not furcate at base, remote from internal margin ; median vein 4-branched, vein 2 arising beyond the middle of cell ; all the venules, veins 3 to 11 inclusive, simple, unbranched, arising independently and nearly equidistant from each other from the end of the cell. The cell is oval in shape, pointed at base. Vein 12 from the base of wing, free, about midway between the subcostal vein and costa.

Secondaries.—Three internal veins. (I am unable to make out vein 1a positively, owing to the condition of the specimen and to the fact that I cannot bleach the wing. Veins 1b and 1c are present, the latter in the normal position of the submedian fold). Median vein 4-branched, cell closed, the cross vein angulated between veins 5 and 6, with a discal fold from the angulation. Vein 6 arises half way from the angulation to the apex of cell, vein 7 from apex of cell ; vein 8 free from base, straight. The frenulum consists of a minute spine, apparently without any costal loop on primaries. The exact location of this genus I will leave to students of the Microlepidoptera. One of the type specimens is in the Edwards collection in the American Museum of Natural History, New York, the other in the collection of Mr. B. Neumoegen.

LIMACODES FERRIGERA, Walker.

Mr. A. G. Butler has very kindly sent me a good coloured figure of the type in the British Museum, and it proves to be *Adoneta spinuloides*, Clem.

GLUPHISIA SEPTENTRIONALIS, Walker.

DASYCHIRA CLANDESTINA, Walker.

Both these names refer to *G. trilineata*, Pack., and both antedate it. Mr. Butler has sent me a sketch of *septentrionalis* and notes on it, and Mr. J. A. Moffat has compared the type of *clandestina* with specimens of *trilineata*, and writes me that "it is, so far as I can make out, almost identical with what we have under the name of *Gluphisia trilineata*." The synonymy will be :—

G. SEPTENTRIONALIS, Walker.
1855, Walker, Cat. Brit. Mus., IV., 1038, *Gluphisia ?*
1882, Grote, check list, p. 18, *pr. syn. trilineata ?*
clandestina, Walker.
1861, Walker, Can. Nat. & Geol., VI., 36, *Dasychira.*
1877, Grote, Can. Ent., IX., 21, *Gluphisia.*
trilineata, Packard.
1864, Packard, Proc. Ent. Soc. Phil., III., 355.

ICHTHYURA APICALIS, Walker.

As suggested by Dr. Packard (Ent. News, IV., 79), this species proves to be *I. vau*. Mr. Butler has sent me a coloured figure of it. The name takes precedence, and we have :—

I. APICALIS, Walker.
1855, Walker, Cat. Brit. Mus., V., 1058.
vau, Fitch.
1859, Fitch, 5th Rept. Nox. Ins. N. Y., 65.
indentata, Packard.
1864, Pack., Proc. Ent. Soc. Phil., III., 352.
ornata, Grote and Robinson.
1868, G. and R., Trans. Am. Ent. Soc., II., 191.
incarcerata, Boisduval.
1868, Boisd., Am. Soc. Ent. Belg., XII., 86.

Not to mention the synonymy of the paler form.

CERTILA FLEXUOSA, Walker.

I have shown Mr. Butler's figure of this to Prof. J. B. Smith, and he feels sure that it represents *Raphia frater*. This removes the name from the list of undetermined Bombyces.

Mr. Butler deserves hearty thanks for his kindness in assisting us to determine these names.

THE MESILLA VALLEY COTTONWOOD LEAF-MINER DETERMINED.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA.

Among the first insects which I found upon my arrival in the Mesilla Valley of New Mexico, in March, 1891, was a small sawfly. My notes on this species were made as follows at the time :—

March, 1891.—Specimens of a small yellowish and brownish sawfly were found quite abundant flying everywhere from middle to last of March. They were not found on any plant, but their numbers make it probable that they will turn up as injurious to some plant. Det. by Dr. Riley as *Blennocampa*, nov. sp.

In an article in Zoe., vol. iii., p. 234–6, Oct., 1892, under the title of a leaf-miner of *Populus fremontii*, I described the larvæ, there supposed to be tineid, and gave an account of their great destructiveness to the foliage of these trees in the Mesilla Valley in 1891 and 1892. All attempts to breed the miner were futile.

However, in April, 1893, the trees were watched carefully during the time when the leaves were opening. The result was that on April 9th, adult sawflies were found very numerous on the cottonwoods, flying about and (apparently) ovipositing in the partially opened leaf bunches. The leaves were one-third to one-half opened at the time.

Specimens of these sawflies were captured on the spot. On being carefully compared with the specimens taken in March, 1891, which, as above mentioned, had been determined by Dr. Riley as a new species of *Blennocampa*, they were found to be the same. Dr. Riley has since expressed doubt *in litt.* that the two were the same. Though I did not breed the species, I am sure quite beyond any doubt that the sawflies caught April 9, 1893, are the adults of the leaf-miner referred to as described in *Zoe.* I am quite as certain also of the identity of these sawflies with the *Blennocampa*, n. sp., determined in 1891 by Dr. Riley.

Dr. Riley has given me *in litt.* the MS. name *Blennocampa populifoliella* to use for this species. I therefore place these notes on record, so that my stand in the matter may be known. It appears that the precise name of the cottonwood of the Mesilla Valley is *Populus fremontii*, Watson, var. *wislizeni*, Watson, as Prof. Cockerell has pointed out to me. (See Bull. 2, Forestry Division, U. S. Dept Agric., 1889, p. 188).

I should also point out that I found in New Mexico other tenthredinid (?) leaf-mining larvæ in *Populus angustifolia*, in the Canada Alamosa (see Journ. N. Y. Ent. Soc., i., No. 2), which belong to a different genus without doubt.

DESCRIPTIONS OF SOME SPECIES OF COLEOPTERA OCCURRING NEAR ALLEGHENY, HERETOFORE UNDESCRIBED.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Preparatory to the publication of a list of the Coleoptera of this vicinity, it has been thought proper to characterize and name the following forms:—

Bembidium postfasciatum.—Coppery-bronzed, dark beneath, elytra pallid, two dark fasciæ. Head convex, impunctate, longitudinally impressed on each side between the eyes, coppery-bronzed; antennæ with three basal joints pale, the others fuscous; thorax quadrate, base and length equal, wider at middle, base truncate, basal striæ double, hind angles rectangular, carinate, dorsal line deep, coppery-bronzed, often tinted green in the basal impressions; elytra pallid, silvery white in life, elongate oval, broadly deeply impressed transversely behind scutellum, deeply striate, striæ dilated before middle and coarsely punctured, punctures finer towards apex, intervals convex, third bipunctate, a broad undulated dark fascia behind middle, another before apex sometimes interrupted at the suture and sides; underside dark, often with a greenish reflection; legs entirely pallid. Length, .18–.21 inch. Characterized from 8 examples. Habitat: Palludial places along streams; not common, but abundant when found. This species has been distributed as a variety of *dorsale*, Say, from which it is abundantly distinct; in that species the head and thorax are brilliant green, the impressions of the thorax less dilated, the striæ of the elytra finer, not dilated near base and with finer punctures, the intervals flat; the fasciæ narrower and less conspicuous, a greenish space around the scutellum and scarcely evidence of a transverse impression.

Platynus parmarginatus.—Elongate, depressed, dark above, antennæ, mouth parts, underside, epipleuræ and reflexed margins of thorax ferrugineous, with a tendency to piceous on the abdomen. Head with deep frontal impressions, a little narrower than the thorax within the marginal reflexions; thorax quadrate, widest at middle, narrowed to apex and base by a curved line, anterior angles prominent, obtusely rounded, posterior obtuse, side-margins uniformly and widely reflexed, discal line fine not reaching base, length and greatest width equal; elytra deeply sinuate at apex, striate, intervals convex, the third with four punctures. Length, .30–.38 inch. Characterized from 30 examples. Habitat:

Channels of spring runs on hills dry in summer; not common, but abundant when found. This has been distributed as a variety of *reflexus*, Lec., from which it is very distinct, the latter being much larger, with a more elongate and differently shaped thorax, tripunctate elytra, and piceous underside and legs. *P. cinctus* has the same form of thorax with *parmarginatus*, but the reflexed margin of the thorax is much narrower anteriorly than posteriorly; the thorax of *reflexus* is perceptibly longer, a little coarctate on the sides before base, widest one-third from apex, and may be termed lyriform.

Stenelophus humidus.—Piceous black, shining, basal joint of antennæ and feet pale. Head short, two-thirds as wide as thorax, smooth, antennæ brown except basal joint, very pilose; thorax quadrate, a little narrowed behind, sides curved, basal angles rounded, scarcely obtuse, impunctate, discal line fine, sometimes obsolete, basal impressions shallow, impunctate, often with minute rugæ, lateral edge narrowly ferrugineous; elytra with impunctate striæ, intervals scarcely convex, the third with a minute puncture at apical third, somewhat iridescent, extreme sutural and marginal edge sometimes pale; scutellar striæ at most rudimentary, frequently invisible; in the ♂, middle and anterior tarsi have the fourth joints deeply bilobed. Length, .18–.20 inch. Characterized from 15 examples. Habitat: Grassy swampy places in meadows and about springs. Abundant. Distinct from *S. plebeius*, which it closest resembles, by its smaller size, less rounded thorax, obsolete scutellar striæ, and other characters seen on comparison. This species has been distributed as Stenelophus, N. S.

Soronia substriata.—Oval, length twice the width, much depressed, pubescent, sordid, rufescent.

Head finely punctulate, a transverse row of minute tubercles and some scattering ones, antennæ brown, fourth joint scarcely shorter than third, antennal grooves nearly parallel; thorax two and one-half times wider than long, apex deeply emarginate, base truncate, sides regularly curved, incurved a little at base, side margins widely explanate and moderately reflexed, medial line indistinct, surface not indented, densely finely punctured to the extreme margin, pubescence fine and matted together on the disk with a brown indument producing a granulated appearance; elytra widest at the base, sides forming with those of the thorax, except the sinuation at base, a regular oval curve and with continuous broad reflexed margins, feebly costate or substriate, densely finely punctured, setose,

pubescence dense, very short and matted on the disk with indument, the margins translucent when cleaned; beneath shining, rufopiceous, undermargin of thorax and elytra very broad and smooth, and with the venter very densely, scarcely visibly punctate. The mentum and its appendages are different from those in the other species, but to be understood a figure is necessary; the strial arrangement is more distinct than in *undulata* or the European *grisea;* there is no appearance of maculation except from abrasion. The indument, whether natural or acquired, could probably be removed like that on *grisea* by washing with ammonia, and when cleaned the surface would be rufous. Only two examples occurred in May under maple *(acer rubrum)* bark.

Corymbites elongaticollis.—Black, sericeo-pubescent; head coarsely confluently punctured, front a little depressed, antennæ, ♂ a little longer than head and thorax, ♀ a little shorter, serrate from the second joint, 3rd scarcely longer than 4th, 11th constricted slightly near tip; thorax one-half longer than wide, not very convex, a little roundly narrowed from middle to apex, slightly constricted before the hind angles which are divaricate and carinate, obsoletely canaliculate at base or not, finely and closely punctured especially on the sides, a little shining when the pubescence is rubbed off; elytra not wider than thorax than which they are twice longer, uniformly narrowed from base, striæ of moderate depth, intervals convex and closely punctured with fine punctures causing a rugous appearance, finely sericeo-pubescent; femora and tibiæ piceous; tarsi rufescent beneath, very slender, 1st joint just perceptibly longer than 2nd, 5th as long as 3rd and 4th conjointly; abdomen sericeous, finely densely punctulate, prothorax and side pieces more coarsely. Length, .32–.45 inch. Described from six examples; not uncommon in Western Pennsylvania, and I took an example at Parry Sound, Ontario. It varies greatly in size. In the series it should be placed near *tarsalis* or *mendax*.

Hemiptychus castaneus.—Elongate-oval, widest at base of thorax and elytra, rufocastaneous, pruinosely pubescent, excessively finely punctulate; thorax at base sinuate each side of middle, obliquely truncate and separated externally from the base of the elytra by an indentation for the knees of the middle feet, external two striæ finely impressed from the middle continuously around the apex uniting with the short apical impressions of the 1st and 2nd striæ, and in two examples traceable anteriorly to the humerus, from which in one of these is an evident third

stria ending at the middle; as indistinctly punctulate below as above. Length, .05 to .08 inch. Described from 4 examples.

The pubescence is excessively fine, pruinose in appearance and lightly attached; when removed the surface seems highly polished, but with a good glass is seen to be densely punctulate. The smooth species of Hemiptychus, while readily separable by the eye, are not easily made known by description.

This species is next to *nigritulus*, the most common near Allegheny and Pittsburg. On vaccineæ and other low bushes; June, July; not abundant.

Isomira ruficollis.—Piceous black, thorax, mouth parts, tibiæ and tarsi ferrugineous. Head densely finely punctulate, transversely impressed between the antennæ, antennæ brown, one-third longer than head and thorax, in both sexes, third and fourth joints subequal, each not much longer than one of the following; thorax at extreme apex as wide as long, twice wider at base, very graduately narrowed from base to near apex and then suddenly incurved, margin exceedingly fine, base not or slightly sinuate each side of middle, hind angles slightly acute, dorsal line often scarcely evident, two or more vague discal impressions sometimes present, punctulation exceedingly fine and dense, dull from a dense microscopic pubescence; elytra at base scarcely wider than the thorax, slightly dilating to apical fourth, sutural stria not impressed before middle, 2nd not evident beyond apical 3rd and no traces of the others; closely, moderately, coarsely, uniformly punctuate over the whole surface, each puncture bearing a short inconspicuous hair, shining; underside punctulate like the upper, metasternum and side pieces more coarsely; length, .17–.21 inch. Described from eight examples.

Not rare on bushes near wet places. The elytra at full maturity are shining black, more or less brownish when immature. In some examples there is an undefined dark spot on the disk of the thorax. In this species, as well as in many other Cistelides, the antennæ differ much in length among individuals of either sex, also in the length of the joints; and the same is true in regard to the distance between the eyes; therefore, these characters are of little value for the separation of the species.

Acalles curtus.—Inflated, without erect setæ, unicoloured, cinereous. Head and beak, except at tip, finely granulato-punctate, punctures concealed by indument; thorax equally wide at apex and base where the width and length are subequal, one-fourth wider at middle, sides arcuately

rounded, disk notably depressed before the scutellum. Surface, when deprived of concealing indument, granular from the density of the punctuation, and with a polished dorsal line, elytra convex, inflated at middle, measured across the convexity as wide as long, roundly contracted from the middle to base where the width equals that of the thorax.posteriorly strongly declivous, deeply and widely striate, punctures large and distant, intervals convex and narrow with a crenate appearance; legs granulato-punctate and coated like the head and thorax. The punctures contain exceedingly short curved bristles visible only when sought for. Length, .08–.10 inch. Described from 4 examples. Easily known from all our species as yet described, by the absence of erect setæ and patches of scales on the elytra, as well as more globose form. Occurs near Allegheny, Pa., in April, about beech trees *(Fagus ferruginea)*, under stones where it has hibernated, but is not often found.

Pachybaris strigapunctus.—Bariform, black, shining, tarsi piceous. Beak polished, slender, long, arcuate; that of ♂ punctate at base and finely irregularly lineate to apex when carefully viewed; that of ♀ scarcely longer, punctate and lineate at base to the insertion of the antennæ; first joint of antennæ nearly three times longer than second, which is one-half longer than third, 3 to 7 equal in length but increasing in thickness, the 7th rather suddenly; thorax wider than long, convergent from base forward, suddenly constricted at apex for the insertion of the head, base with a long scutellar-lobe on each side of which it is slightly sinuate, finely, closely strigate in longitudinal wavy lines, scatteringly punctured especially near the apex, a fine median line from apex to scutellum; elytra a little wider than the thorax, twice longer, widest at middle, finely striate, striæ not obviously punctured, intervals flat, uniseriately punctured, each puncture containing a white scarcely projecting hair or seta; underside, pro- and meso-thorax and legs rather coarsely closely punctured, venter more finely, white setæ of the punctures more conspicuous than above; tibiæ roughly striate and punctured. The ♂ has an acute tubercle before the anterior coxæ, in one example a spine as in some *Centrinus;* the anterior coxæ are not widely separated, the prosternal cavity is well marked but not incised. Length, .12 to .15 inch. Characterized from 3 ♂ and 3 ♀ examples. Occurs in May and June on *Cratægus*, but not abundantly.

Balaninus confusor.—Form, colour and vestiture the same as in *B. nasicus*. Rostrum in both sexes thickened and punctured at base, that of

the female not exceeding three-fourths the length of the body, and the antennal scape equaling the three basal joints. Hind femur with an oblique medium-sized tooth; claws with appendices acute. Length, .24 to .28 inch. Described from 5 ♂ and 5 ♀ examples. The foregoing characters will readily separate this species from any with which it is likely to be confused:—The oblique femoral tooth and acute claw appendix, from *B. nasicus* which it most resembles; the longer antennal scape of the ♀ and the beak thickened and punctured at base in both sexes, from *B. uniformis;* the acute claw appendices, denser vestiture and *nasicus* shape, from *obtusus*. Abundant in western and south-eastern Pennyslvania, West Virginia, south-eastern Ohio, Massachusetts, and North Carolina. Blanchard. For further comparative characters, see CAN. ENT., xxii., 7.

I have obtained this species from the acorns of *Quercus ilicifolia*, but it probably depredates on the fruit of other species of oak. An example was also obtained from one of the large apple-galls of *Solidago nemoralis;* these galls are composed of a compact porous mass caused by the larva of a fly named by Fitch *Acinia solidaginis* (Rep. 1st). The gall contained three coleopterous larvæ after the fly escaped, one of which developed the next year and turned out to be this species. Oviposition on this gall can scarcely have been otherwise than a mistake on the part of the parent.

NOTES AND QUERIES.

BY REV. W. J. HOLLAND, PH. D., ALLEGHENY, PA.

I have just received a specimen of an Erebus odora, which was captured last Wednesday evening (Sept. 27th) in the lecture-room of the First United Presbyterian Church, in the city of Allegheny, where its appearance caused no little consternation among the devout "mothers in Israel" who were at prayer meeting, and who thought it was a bat, of which evil things are said by the unsophisticated. It is a male in good case. This is the third specimen I have received this summer. The first was taken about four weeks ago in the cellar of my father's residence in Bartholomew County, Indiana. The second was taken at Jeannette, Pa., near a spring-house. All three specimens are fresh in appearance, as if not long from the chrysalis. Undoubtedly this great moth is more than an occasional visitor from the tropics, and should be reckoned as belonging to our fauna, though scarce. Its capture has been recorded north of the Ohio and Potomac many scores of times, and it has been taken repeatedly in Canada.

Papilio Cresphontes, for the first time, has been taken this summer in the neighborhood of Pittsburgh, and in considerable numbers. One collector obtained four specimens in one locality. The food-plant is Zanthoxylum and Ptelea in these parts. In Florida its larva is abundant upon the orange and lemon trees.

One of the commonest of our Papilios is Philenor. Here its larva is found upon Aristolochia. In southern Indiana, in Bartholomew county, I have observed it summer after summer, sometimes in immense numbers. It is one of the commonest butterflies there, as here. But, with the exception of one or two specimens of Aristolochia growing about verandahs in the village of Hope, I think I may safely say there is not a plant of Aristolochia within many miles of the fields in which I have counted the perfect insects by the score. What is the other food plant upon which the larva feeds? It runs in my mind that I have read that the caterpillar has been found upon the smart-weed (*Polygonum hydropiper*), but I cannot recall where I have seen this statement made. I have never been able to verify it by observation. Perhaps some reader of the CANADIAN ENTOMOLOGIST may be able to throw light upon the subject.

The banana merchants in our town have proved themselves possessed of curious entomological stores. I have received from them a couple of living tarantulas, and not long ago a living specimen of Caligo Teucer, which had emerged from a chrysalis hidden in a bunch of bananas. The insect had been transported by sea and land from either Honduras or some port in the northern portion of South America, a journey of several thousand miles. This reminds me that in several consignments of eastern Lepidoptera I have found our Danais plexippus, Linn. One of the sendings was from Borneo, the other from Java. We shall soon hear of its domestication on the mainland of Asia, and it will probably spread all over China and Japan. The insects taken by the U. S. Eclipse Expedition of 1889, at the Azores, numbered among them two specimens of this butterfly. There were only about a dozen specimens of insects taken at the Azores by the industrious? naturalists of the party, and I judge that it must be common there. Why we have not yet heard of its domiciliation on the African continent is a mystery to me. It will no doubt get there before long.

I have a specimen of Limenitis taken in Warren county, Pa., this summer, which is most remarkable. It has all the markings of L. ursula,

but both the primaries and secondaries are crossed by very broad, white bands, as in L. arthemis. It is, however, larger than any specimens of Arthemis I have ever seen, and exceeds the majority of L. ursula in size. It has the white spots in the cell of the primaries which appear in some female specimens of L. Weidemeyeri. It is altogether a queer beast combining the characteristics of three of our species. No doubt they all sprang from a common ancestry, and this specimen reveals the force of atavism.

EXOCHILUM MUNDUM, SAY, ATTACKING THE FALL WEB-WORM.

BY A. H. KIRKLAND, ASSISTANT IN THE AMHERST, MASS., INSECTARY.

One hot afternoon in the early part of August, 1893, while out collecting, I found a large web of the Fall Web-Worm (*Hyphantria cunea*, Drury), on a young apple tree. Reaching up to cut off the twigs to which the web was attached, my attention was attracted by an unusual disturbance among the inmates of the web. Closer inspection revealed the fact that a medium-sized Ichneumon fly had intruded within the family circle, and was proving herself a most unwelcome visitor. Tearing into the web with her feet she would force her way along until she arrived under the skeletonized leaves upon which the larvæ were resting and through which they were plainly visible. When her presence was noticed by the larvæ lying on a large leaf nearest the intruder, they raised their heads and swung them rapidly from side to side, and at the same time each one emitted a drop of greenish fluid from its mouth. Meanwhile the Ichneumonid had crept up under the leaf, and bending the posterior segments of her abdomen until the partly exserted ovipositor extended forward between the feet and beyond the head, she poised herself for a moment as if to take aim, then with lightning rapidity she darted her abdomen and ovipositor still farther forward and struck through the leaf into the body of a larva, which at once commenced to writhe and twist as if in great pain. I watched this operation continue for about half an hour and did not observe the Ichneumonid sting any larva more than three or four times, usually but once.

Upon attempting its capture it broke out of the web and flew off. Soon, however, it returned, and after circling about for a short time as if to select a favorable place for renewing operations, it alighted and again forced an entrance into the web. This time my efforts were successful, and my capture, as kindly determined by Prof. Fernald, proved to be *Exochilum mundum*, Say. The larvæ that had been stung were brought to the Insectary for the purpose of obtaining more specimens of this interesting Ichneumonid.

NORTH AMERICAN THYSANURA—IV.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Most modern European writers follow Tulleburg in placing all the Collembola in the family *Poduridæ*, and including the *Poduridæ*, *Lipuridæ* and *Anouridæ* of Lubbock in the subfamily *Lipurinæ*. It would seem more natural to restrict the name *Poduridæ* to those genera bearing the saltatory apparatus on the antepenultimate abdominal segment, instead of the penultimate, and then to include those genera in which the saltatorial apparatus is wanting under the name *Aphoruridæ*.*

APHORURIDÆ, nom. nov.

Body naked, generally small; antennæ four-jointed; ocelli present or absent; postantennal organ usually present; tarsi with one or two claws; furcula wanting.

The genera belonging to this family can be readily separated by means of the following table:—

A. Mouth parts not produced cone-like beneath the head.
  B. Tarsi with two distinct claws..... .... *Aphorura.*
  BB. Tarsi with a single stout claw.
    C. Postantennal organ wanting. .... *Bourletia.*
    CC. Postantennal organ present.
      D. Anal spines present; postantennal organ transverse..... .... *Tullbergia.*
      DD. Anal spines wanting; postantennal organ circular.. .... *Anurida.*
AA. Mouth parts produced cone-like beneath the head.
  B. Ocelli present, three on each side of the head..... *Neanura.*
  BB. Ocelli wanting..... .... *Aphoromma.*

Aphorura,† gen. nov.—Ocelli wanting; antennæ four-jointed; postantennal organ present; ocellate punctures at base of the antennæ present; lower claw of tarsi distinct. Type, *Podura ambulans*, Linn.

Proposed for Lipura, Burm., which is preoccupied in Mammology.

Bourletia, gen. nov.—Ocelli sixteen, eight on each side of the head; antennæ four-jointed; ocellate punctures, postantennal organ, anal spines and lower tarsal claw wanting. Type, *Anurophorus laricis*, Nic.

Lipura and *Anura* are both preoccupied in zoology.

†α, priv.; φορός, ferens; οὐρά, cauda.

Tullberg uses *Anurophorus*, Nic., for this species, but both *Anurophorus* and *Adicranus*, Bourl., have *Podura fimetaria*, Linn., as type, which belongs to *Lipura*, Burm. The genus is named for the Abbe Bourlet, a well-known writer on Thysanura.

Tullbergia, Lubbock.—Ocelli wanting; antennæ four-jointed; post-antennal organ present; lower claw of tarsi wanting; anal spines large, stout; body elongate. Type, *Tullbergia antarctica*, Lub.

Anurida, Laboulb.—Ocelli ten, five on each side of the head; antennæ four-jointed; postantennal organ present; ocellate punctures, lower claw of tarsi, and anal spines wanting. Type, *Achorutes maritimus*, Guer.

Anurida maritima, Guer.—Body plumbeous, sparsely covered with long hairs; head triangular, produced between the antennæ, broadly truncate in front, broadly emarginate behind; antennæ shorter than the head, basal segment large, globular, one-half broader than the other segments, second segment a little longer than the first, the third and fourth closely joined, as long as the first and second together; eyes five, two in front and three behind; postantennal organ with seven prominences, arranged in the form of a circle; legs short and stout, covered with long stiff bristles; claws long, blunt, one-half the length of the tibia. Length, 3 mm.

Habitat: Eastern coast of the United States, Europe.

Neanura, gen. nov.—Ocelli six, three on each side of the head; antennæ four-jointed; postantennal organ present or wanting; ocellate punctures, anal spines, and lower claw of tarsi wanting; mouth parts produced cone-like beneath the head. Type, *Achorutes muscorum*, Temp.

Proposed for *Anoura*, Gerv., which is preoccupied in Mammology.

Aphoromma,‡ gen. nov.—Ocelli wanting; antennæ four-jointed; postantennal organ present; ocellate punctures, anal spines, and lower claw of tarsi wanting; mouth parts produced cone-like beneath the head. Type, *Anoura granaria*, Nic.

PODURIDÆ.

Body cylindrical, naked, usually small; antennæ four or five-jointed; eyes present, with ten to thirty ocelli; postantennal organs usually wanting; tarsi with one or two claws; furcula present, attached to the fourth abdominal segment.

‡α, priv.; φορός, ferens; ὄμμα, oculus.

The genera belonging to this family, as restricted above, can be separated as follows :—

A. Mouth parts not produced cone-like in front of the head.
  B. Antennæ four-jointed.
    C. Tarsi with two claws.
      D. Abdomen without anal spines.....*Achorutes.*
      DD. Abdomen with anal spines.
        E. Abdomen with two anal spines.....*Schoturus.*
        EE. Abdomen with four anal spines...*Tetracanthella.*
    CC. Tarsi with a single claw.
      D. Ocelli twenty-eight or thirty, fourteen or fifteen on each side of the head ; anal spines wanting.....*Podurhippus.*
      DD. Ocelli less than twenty-eight.
        E. Anal spines wanting.
          F. Furcula long, reaching beyond the apex of the abdomen, arcuate.....*Podura.*
          FF. Furcula short, never extending beyond the apex of the abdomen, not arcuate.
            G. Legs long, distinctly visible from above.....*Pseudachorutes.*
            GG. Legs extremely short, not visible from above.....*Brachysius.*
        EE. Anal spines present.
          F. With two anal spines.....*Xenylla.*
          FF. With more than two anal spines.
            G. With three anal spines.....*Triæna.*
            GG. With four anal spines .....*Oudemansia.*
  BB. Antennæ five-jointed.....*Lubbockia.*
AA. Mouth parts produced cone-like in front of the head.*Gnathocephalus.*

Achorutes, Temp.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ short, four-jointed ; body cylindrical, segments sub-equal ; tarsi with two claws ; anal spines wanting. Type, *Achorutes dubius*, Temp.

Achorutes longispinus, sp. nov.—Body cylindrical, purplish-black, hairy ; head large, rounded in front, truncate behind, prolonged between the antennæ, acutely triangular ; eyes on a small black patch almost directly behind the antennæ in the middle of each lateral half of the head ; antennæ about as long as the head, basal joint globular, minute, incon-

spicuous, set in an excavation beneath the frontal projection, second and third joints subequal, globular, fourth joint elongate, as long or longer than the three basal joints, cylindrical, pointed, the inner side at apex appearing truncated; legs stout; claws large, inner claw more than half the length of outer, outer with a denticle at base; furcula elongate, reaching the hind pair of legs; manubrium large, reaching beyond the apex of the abdomen, sides straight, sub-parallel; dentes elongate, as long as the manubrium, broadest at middle, underside with two or three rows of stiff spines; mucrones short, not longer than broad, with an apical and a preapical tooth. Length, 1–1.25 mm.

Habitat: Alameda, near Las Cruces, New Mexico.

Received from Mr. Theo. D. A. Cockerell, who had received them from Mr. E. VanPatten, "who found them in immense numbers at Alameda."

Schoturus,‖ gen. nov.—Ocelli sixteen, eight on eaeh side of the head; postantennal organ wanting; antennæ short, four jointed; body cylindrical, segments sub-equal; tarsi with two claws; anal spines present, two. Type, *Podura nivicola*, Fitch.

This genus is proposed for those species at present placed in the genus *Achorutes* and which have anal spines.

Schoturus nivicola, Schott. Ocelli sixteen, eight on each side of the head; postantennal organ present; antennæ four-jointed; tarsi with two claws; anal spines present, four, arranged in two rows; furcula short. *Schoturus nivicola*, Schott.

Podura, Fitch, Trans. N.Y., VII., 1851, 101; fig.

Degeeria, Megnin. Ocelli twenty-eight or thirty, fourteen or fifteen on each side of the head; antennæ four-jointed; tarsi with a single claw; furcula short, slender; ventral tube tuberculate, bilobed. Type, *Degeeria nivicola*, Megnin.

Ann. Soc. Ent. France, VIII., 1878, p. cxxxv.; Les Parasites, 1880, [illegible]

[illegible] eight on each side of the head; post-[illegible] four-jointed; tarsi with a single claw; [illegible] anal spines wanting. Type, *Podura*

[illegible] Body, legs and antennæ bluish-black; [illegible] Canada.

antennæ long and slender, longer than the head; head with a quadrangular tubercle between the eyes; thorax slender, much narrower than the head; legs short and stout; claws long and slender, as long as the tibia and tarsus together; tenant hair present; furcula long and slender, reaching the first pair of legs, densely covered with closely placed, blunt, spiny tubercles, the tubercles arranged in transverse rows around the spring, giving the spring a striated appearance with a low objective; manubrium short and stout, apex produced between the dentes broadly triangular; dentes long, slender, a few scattered hairs, and indications of a transverse suture at middle; mucrones short, pointed, with a triangular tooth at base. Length, 1.25 mm.

Habitat: Tennessee.

Collected in great numbers by Prof. H. E. Summers from the surface of thin, slimy mud.

Pseudachorutes, Tullb.—Ocelli sixteen, eight on each side of the head; postantennal organ wanting; antennæ conical, four-jointed; tarsi with a single claw; furcula short, reaching the apex of the abdomen; anal spines wanting. Type, *Pseudachorutes subcrassus*, Tullb.

Brachysius,§ nov. gen.—Ocelli sixteen, eight on each side of the head; postantennal organ wanting; antennæ short, not longer than the head is broad, four-jointed; tarsi with a single claw; furcula short, not reaching the apex of the abdomen nor the ventral tube; anal spines wanting; legs short and stout, not reaching the side of the body. Type, *Brachysius dilatatus*, sp. nov.

Brachysius dilatatus, sp. nov.—Bluish mottled with gray; antennæ short, not much longer than the head, first joint very small, second and third subequal, fourth almost as long as second and third together; body long and slender, broader towards the caudal end; legs short and slender, not extending beyond the side of the body; furcula short and slender; anal papillæ small, not divided, covered with stiff bristles. Length, 2 mm.

Habitat: Ithaca, N. Y.

This species has the habitus of those of the genus *Neanura*, but can be readily distinguished by the number of ocelli and by the presence of the furcula.

Xenylla, Tullb.—Ocelli ten, five on each side of the head; postantennal organ wanting; antennæ four-jointed; body cylindrical; tarsi with a single claw; anal spines present, two. Type, *Xenylla maritima*, Tullb.

§βραχύς, brevis; ἰσσός. jaculum.

Triæna, Tullb.—Ocelli sixteen, eight on each side of the head; postantennal organ wanting; antennæ four-jointed, conical; tarsi with a single claw; furcula extremely small, papilliform; anal spines present, three. Type, *Triæna mirabilis*, Tullb.

Oudemansia, Schott.—Ocelli sixteen, eight on each side of the head; postantennal organ wanting; antennæ short, four-jointed; body cylindrical, segments subequal; tarsi with two claws; anal spines present, four, arranged in a circle around the apex of the abdomen; furcula not attaining the ventral tube. Type, *Oudemansia cærulea*, Schott.

Entom. Tids., XIV., 1893, 174; pl., II., 1–7.

Lubbockia, Haller.—Antennæ five-jointed, longer than the body; all the tarsi with tenant hairs, small on the front and middle pairs; anal spines present, two; furcula small; body cylindrical, segments subequal. Type, *Lubbockia cærulea*, Haller.

Mittheil. Schweiz. Entom. Ges., VI., 1880, 4.

Gnathocephalus,* gen. nov.—Ocelli sixteen, eight on each side of the head; postantennal organ wanting; antennæ short, conical, four-jointed; body cylindrical; tarsi with a single claw; anal spines wanting; furcula short, not attaining the ventral tube; mouth-parts folded together in the form of a tube and projecting in front of the head. *Gnathocephalus complexus*, sp. nov.

Gnathocephalus complexus, sp. nov.—Body robust, broadest behind, bluish-black, a row of paler spots down each side, and a few scattered hairs on the caudal end; head small, triangular, strongly produced between the antennæ, broadly truncate in front; eye spot small, on a raised tubercle; antennæ slightly longer than the head, basal segment a little longer than broad, broadest at middle, second segment as broad as the first and slightly shorter; third and fourth segments sub-equal, longer than the first and second, and much narrower, the suture between them not distinctly indicated; legs long and slender, with lighter markings and scattered regularly placed bristles; tenant hairs wanting; claws stout; furcula short, stout; manubrium half as broad as the abdomen, nearly as broad as long, slightly incised between the dentes; dentes two-thirds the length of the manubrium, cylindrical, narrowed at apex; mucrones one-half the length of the dentes, slightly arcuate, without teeth. Length, 3–4 mm.

Habitat: Olympia, Washington. (Trevor Kincaid, collector.)

*Γνάθος, maxilla; Κέφαλὸς, caput.

ON THE EUDRILINÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In an original memoir on the *Zygaenidæ*, published by the Essex Institute, Dr. Packard explained the relation of *Castnia* and allied genera to the European genus *Zygaena*, and contended for the solidarity of the group as the equivalent of the large family of *Bombycidæ* in the Latreillean sense. The view, advocated by Agassiz, that *form* was a family criterion, not only form in general, but form of parts underlying form in general, obtained. Of a truth Dr. Packard's "family," *Zygaenidæ*, contained genera more or less evidently related in one or other of their stages, and the agreement which Dr. Packard found in the form of the clypeus authorized their being brought together in a family group. This view has been followed by me in my papers and lists, and any adverse criticism of my particular course with regard to these insects is consequently ill-founded; while the inherent want of precision which our classifications must present allows of a shifting opinion, within limits, as this or that character appears in turn to be the decisive one, and renders such criticism unnecessary. The tendency of classificators latterly has turned in the direction of a breaking up of these "families" into smaller groups still called "families," but based rather upon ultimate peculiarity than "form." Under the vague term "Bombyces," the various new families of the Spinner moths are still kept together, in recognition of a less tangible relationship which nevertheless is still held to exist; while the view, that the present representation of these families is the modified survival of the roots of the lepidopterous tree, is being seriously considered by students of phylogeny. Classificators of the lepidoptera who seize only upon ultimate peculiarities of a common and essential part of the perfect insect, will, in the nature of things, eventually come to grief. Such modifications we may use to separate species, and, when so evident as to be of practical service, in the more artificial region of generic division; but, as we ascend higher, they diminish in importance and are superseded by characters of development, persistent or evanescent, offered in different stages of growth of the species. By these characters indications as to the truer affinities of the insect are given. The time is perhaps going by when lepidoptera are to be solely classified by final peculiarities of the legs, wings or tails of the perfect insect. Still, there will always be those whose observations in these directions will seem to themselves of prime importance, while, in the end, the value

of their observations will be differently expressed in our classifications. The family "*Zygaenidæ*" has shared the fate of disintegration with the family "Bombycidæ." Dr. Packard now recognizes three family groups: *Agaristidæ*, *Castniidæ* and *Zygaenidæ*. The sub-family *Eudriinæ*, as I would consider it, the subject of the present notice, belongs, with the sub-family *Alypiinæ*, to the *Agaristidæ*. The present sub-family seems to be exclusively American; at least I have met in literature with but one extra limital form, the African genus *Ovios*, which may possibly belong here. The general form of the perfect insect recalls that of the *Noctuidæ*, so that Hübner considers it one, while Boisduval proposes the genus *Eudryas* for the typical generic group and apparently recognizes its structural affinities to *Castnia*. The larva, as we now know, is closely allied to that of *Alypia*. The genera of the *Eudriinæ* may be briefly distinguished as follows:—

1. Structure of the male wings normal,	2.
Structure of the male wings abnormal.	*Euscirrhopterus, Grt.*
2. Male antennæ simple,	3.
Male antennæ pectinate.	*Ciris*, Grt.
3. Front smooth.	*Eudryas*, Boisd.
Front horned.	*Copidryas*, Grt.

With regard to the geographical distribution *Eudryas* occurs in North America (east and west coast), and in South America (Paraguay). *Copidryas* in North America (New Mexico, Texas) and in South America.* (? Buenos Ayres). *Euscirrhopterus* is Cuban and *Ciris* is from Texas. With regard to the species, it is not entirely impossible that Walker's type of *Eudryas Stæ. Johannis* represents a Florida species else unknown. It is pronounced by Prof. Smith to be an aberration of *E. grata*, and its divergence from the type to have been probably produced by the "vicissitudes of the voyage." The former statement may not improbably be the true solution of the matter, since so prominent an insect should have been turned up by collectors in Florida ere this, one might think. But the cause assigned for such an aberration I am unable to follow, or even to understand. What is meant by "vicissitudes of the voyage?" The pupa (?) could not have suffered shipwreck or been washed ashore! What records are there in literature of extraordinary variations being produced through ordinary transportation by sea? The chances against the

* See Papilio 3, 106. Berg's *Platensis*, as I understand his remark as to the front, probably belongs to *Copidryas*.

unprotected survival during the voyage, that this pupa should produce an unique variety, the capture of the perfect moth on a Church step in England, its delivery at the British Museum, taken altogther seem enormous. The fact that the hind-wings are unbanded is paralleled in the case of a new species from South America, which I describe here. According to Mr. Tutt's kind communication: There is a place in Southwark, one of the London districts close by London Bridge, called "Horselydown," and there is a church there called St. John's. As this is very near the river an imported insect might be found there if we suppose it to escape from the shipping on the Thames. But there is also a place called "Horsley" in Surrey, and there are some well-known "Downs" there which have been entomologically worked over from a long period. But there is no St. John's Church there, and under the theory that Walker named the insect from the Church in England, and not, as I had imagined possible, from the St. John's River, Florida, where Doubleday collected, the Surrey locality must be abandoned. We are, therefore, driven to the conclusion that if the label is genuine, the specimen was really captured at "Horselydown," and that "Horsley Downs" is a mistake for the former on the label. If a normal specimen of *Eudryas grata* had been stated to have been caught in England, while still extraordinary, there would have been nothing so very improbable in the fact, since, according to Wood and other English authors, *Drasteria*, *Eustrotia* and other American moths have been so taken (?); I myself took a specimen of a South American species of Noctuidæ on the Battery in New York. But that this particular specimen should belong also to a very remarkable variety, never observed in America, increases the chances against the story (which may nevertheless be a true one) enormously. *Eudryas*, we may concede, might stand the voyage as a pupa and also escape as a moth in London, but how a *Stæ. Johannis* could have been turned out of a *grata* caterpillar or pupa owing to the "vicissitudes of the voyage" I do not comprehend. The type which I saw in 1868 differed not only from *grata* in its unbanded secondaries, but also by its differently coloured and perhaps marked primaries. While I recognized it as allied to *grata*, I could not help supposing it a distinct species, since I had never known *grata* to vary in that manner. In fact, that it might be a variety did not, I think, occur to me. I did not visit the Museum for the express purpose of studying *Stæ. Johannis*. I took it in rapidly and saw that it was an *Eudryas* and differed from both our common species, *grata* and *unio*, and simply re-

corded the fact that it impressed me as a distinct and even larger species. It may be that we are already in possession of the final solution of this little entomological mystery, and that *Stæ. Johannis* is really an extraordinary variation of *grata*, captured on the Church door of St. John's, in Horselydown, London, England. But it will nevertheless remain an interesting subject until we find specimens in America of the aberration, which ought to occur there also, or until we send *grata* pupa across the Atlantic and observe the effects of the "vicissitudes of the voyage." If any of these latter evolve as *Stæ. Johannis*, the mystery would be solved, and an important phase in the general subject of variation opened up. But I cannot think it. The aberration, if one, must have a cause independent of the mere voyage. Moisture, temperature, might possibly darken the primaries, but how are we to account for the secondaries, which so far from being "suffused," have no band at all, the usual ground colour obtaining over the whole surface? Here is a specimen which on the fore-wings is to show the effects of melanism, and on the hind-wings of albinism. The type of *Stæ. Johannis* is, under the circumstances, one of the most extraordinary specimens, I think, in the British Museum collection, whatever view we take of the matter, and the question before the American collector now is the range of variability in *E. grata*, and whether this shows any steps in the direction of a darkening of the fore wings and obliteration of the median band and boundaries. Thus, quite independent of mere controversy as to the origin of the type, the subject is eminently one for scientific inquiry and experiment.

Endromis Cynthia.

The [illegible] pale vermillion red above and below, [illegible] Fore wings beneath of the same [illegible] The fore wings have the main central portion [illegible] shading inferiorly to ochrey- [illegible] over the median ner- [illegible] and deepening in colour in [illegible] marked superiorly on costa [illegible] the cell to anal angle this [illegible] the wing. The some [illegible] The costal edge [illegible] shading recalls [illegible] in the N. American [illegible] are fragment-

ary, as in *unio*. Abdomen red on the sides; venter pale. Antennæ simple. Front not tuberculate. One female from Assumption (So. America, coll. Consul Mangels) in Mus. Bremen.

This species is perhaps a little smaller than *grata*, very different from both N. American species by the darker creamy shade, not white, of the median field of primaries, by the red colour of hind-wings and under-surface, by the red abdomen and unbanded secondaries. It is, in shape of primaries and in their style of ornamentation, nearer *grata* than *unio*. The discovery of a South American representative of *grata*, with unbanded secondaries, is interesting. The latter character is only found in *E. Stae. Johannis*, where the yellow hind-wings are without band. Although on this account alone the specific value of the latter may not be adequately defended, yet the probabilities in favour of this view may be considered to become somewhat heightened in view of the discovery of the South American species. The terminal bands of the hind-wings in *grata* and *unio* are decidedly characteristic, and one is unprepared for their absence in *Stae. Johannis*, unwilling to consider so marked a modification merely varietal.

The following is a list of the *Eudriinæ*:—**

Eudryas, Boisd.
1. unio, *Hübn.*
var. brevipennis, *Stretch.*
2. grata, *Fabr.*
assimilis, Boisd.
ab? Stræ. Johannis, *Walk.*
3. Cypris, *Grt.*
Ciris, Grt.
4. Wilsoni, *Grt.*

Copidryas, Grt.
5. Gloveri, *G. & R.*
6. platensis, *Berg.*

Euscirrhopterus, Grt.
7. Poeyi, *Grt.*
disparilis, H.-S.

The North American *Agaristidæ* apparently fall into two sub-families, the *Eudriinæ*, above catalogued, and the *Alypiinæ*, containing *Alypia*, *Androloma*, *Pseudalypia*, *Edwardsia*, and *Psychomorpha*. The *Castniidæ* are apparently not represented in the North American fauna. The *Zygænidæ* are now restricted by Dr. Packard so as to include *Horama*, *Burtia* and allies, with *Ctenucha* and *Scepsis* in one sub-family group, while *Procris*, *Harrisina* and their allies fall into the typical sub-family, being more intimately related with the European *Zygæna*, a genus not represented with us. From this it will appear that a belief in the stability of the rearrangement of the *Zygænidæ* in the Philadelphia List will probably prove illusory. The genus *Oeta*, Grt., should be removed to the *Tineidæ*, as indicated by Zeller.

** For a list of our species consult also Papilio I., 177. I have never seen a Californian specimen, and am quite doubtful as to *brevipennis* being a variety of *unio*. Stretch's figure and description were made from an imperfect example. The Cuban *E. Poeyi* was subsequently described by Herrick-Schaeffer as *Heterandra disparilis*; on comparison of the dates of issue of the two publications, which appeared nearly at the same time, the Philadelphia paper has priority.

LIST OF COLEOPTERA TAKEN AT SPARROW LAKE, ONT.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

[In our last number, pages 272–5, the lists of Coleoptera were unfortunately disarranged in making up the forms. We accordingly reprint them in their proper order.—ED. C. E.]

Cicindela repanda, *Dej.*
var. 12-guttata, *Dej.*
Cychrus Lecontei, *Dej.*
Carabus sylvosus, *Say.*
Calosoma scrutator, *Fab.*
Wilcoxi, *Lec.*
calidum, *Fab.*
Elaphrus ruscarius, *Say.*
Loricera cærulescens, *Linn.*
Nebria pallipes, *Say.*
Scarites subterraneus, *Fab.*
Dyschirius nigripes, *Lec.*
Bembidium patruele, *Dej.*
versicolor, *Lec.*
Sp. undetermined.
Tachys nanus, *Gyll.*
flavicauda, *Say.*
Patrobus longicornis, *Say.*
Pterostichus honestus, *Say.*
coracinus, *Newm.*
stygicus, *Say.*
lucublandus, *Say.*
caudicalis, *Say.*
luctuosus, *Dej.*
corvinus, *Dej.*
cytiscopus, *Dej.*
Amara exarata, *Dej.*
pallipes, *Kirby.*
sulcicollis, *Lec.*
Calathus gregarius, *Say.*
Platynus striatus, *Dej.*
extensicollis, *Say.*
sp. ?
Platynus melanarius, *Dej.*
corvus, *Lec.*
placidus, *Say.*
Bogemanni. *Gyll.*
ruficornis, *Lec.*
Galerita janus, *Fab.*
Lebia viridis, *Say.*
Metabletus americanus, *Dej.*
Cymindis pilosa, *Say.*
Brachynus cyanipennis, *Say.*
Chlænius sericeus, *Forst.*
pennsylvanicus, *Say.*
Anomoglossus emarginatus, *Say.*
Brachylobus lithophilus, *Say.*
Agonoderus pallipes, *Fab.*
Harpalus erraticus, *Say.*
viridiæneus, *Beauv.*
Sp. undetermined.
pennsylvanicus, *De G.*
fallax, *Lec.*
pleuriticus, *Kirby.*
viduus, *Lec.*
Stenolophus plebeius, *Dej.*
conjunctus, *Say.*
Anisodactylus Harrisii, *Lec.*
interstitialis, *Say.*
Hybius biguttatus, *Germ.*
Hydaticus stagnalis, *Fab.*
Dytiscus fasciventris, *Say.*
Gyrinus canadensis, *Reg.?*
analis, *Say.*
Berosus striatus, *Say.*
Pimelia perplexus, *Lec.*

Hydrobius fuscipes, *Linn.*
Creniphilus sub-cupreus, *Say.*
Cercyon pygmæum, *Ill.*
Necrophorus vespilloides, *Hbst.*
Silpha Americana, *Linn.*
Liodes discolor, *Mels.*
Homalota trimaculata, *Er.*
Bolitochara picta, *Fauv.*
Aleochara bimaculata, *Grav.*
graciliformis, *Fauv.*
Gyrophæna vinula, *Er.*
Quedius fulgidus, *Fab.*
lævigatus, *Gyll.*
Listotrophus cingulatus, *Grav.*
Creophilus maxillosus, *Linn.*
Staphylinus violaceus, *Grav.*
Philonthus politus, *Linn.*
longicornis, *Steph.*
micans, *Grav.*
cyanipennis, *Fab.*
sordidus, *Grav.*
Sp undetermined.
Xantholinus obsidianus, *Mels.*
emmesus, *Grav.*
obscurus, *Er.*
N. S. (found here).
Baptolinus longiceps, *Fauv.*
Stenus—3 sp.
Lathrobium punctulatum, *Lec.*
bicolor, *Lec.*
Stilicus, sp.
Pæderus littorarius, *Grav.*
Sunius longiusculus, *Mann.*
Tachinus repandus, *Horn.*
fimbriatus, *Grav.*
Erchomus ventriculus, *Say.*
Conosoma pubescens, *Payk.*
Boletobius cincticollis, *Say.*
Olisthærus substriatus, *Gyll.*
Oxyporus femoralis, *Grav.*
rufipennis, *Lec.*
Oxytelus sculptus, *Grav.*
pennsylvanicus, *Er.*
insignitus, *Grav.*
Trogophlœus 4-punctatus, *Say.*
Scaphisoma convexum, *Say.*
Hippodamia 3-punctata, *Linn.*
Coccinella trifasciata, *Linn.*
Chilocorus bivulnerus, *Muls.*
Psyllobora 20-maculata, *Say.*
Hyperaspis signata, *Oliv.*
Scymnus lacustris, *Lec.*
Endomychus biguttatus, *Say.*
Tritoma thoracica, *Say.*
Silvanus bidentatus, *Fab.*
Læmophlæus fasciatus, *Mels.*
Hister depurator, *Say.*
sedecimstriatus, *Say.*
carolinus, *Payk.*
Lecontei, *Mars.*
Epuræa Erichsonii, *Reit.*
Sp.
Ips fasciatus, *Oliv.*
Stephostethus liratus, *Lec.*
Corticaria pusilla, *Mann.*
pumila. *Lec.*
Tenebrioides corticalis, *Mels.*
Cyphon obscurus, *Guer.*
Deltometopus amœnicornis, *Say.*
Dromaeolus Harringtoni, *Horn.*
Alaus myops, *Fab.*
Agriotes fucosus, *Lec.*
Sp.
Melanotus castanipes, *Payk.*
fissilis, *Say.*
Corymbites medianus, *Germ.*

Cormybites propola, *Lec.*
Dicerca tuberculata, *Chev.*
Sp. undetermined.
Buprestis rusticorum, *Kirby.*
fasciata, *Fab.*
Agrilus ruficollis, *Fab.*
Calopteron terminale, *Say.*
Calochromus perfaceta, *Say.*
Ellychnia corusca, *Linn.*
Telephorus lineola, *Fab.*
scitulus, *Say.*
Collops tricolor, *Say.*
Trichodes Nuttalli, *Kirby.*
Hydnocera pallipennis, *Say.*
longicollis, *Zieg.*
Cis fuscipes, *Mellie.*
Canthon lævis, *Drury.*
Onthophagus Hecate, *Panz.*
Dialytes striatulus, *Say.*
Ulkei, *Horn.*
Aphodius fossor, *Linn.*
fimetarius, *Linn.*
ruricola, *Mels.*
leopardus, *Horn.*
lentus, *Horn.*
Geotrupes splendidus, *Fab.*
Anomala lucicola, *Lec.*
Dyscinetus rotundus, *Say.*
Euphoria fulgida, *Fab.*
Osmoderma eremicola, *Knoch.*
Trichius affinis, *Gory.*
Valgus calceatus, *Say.*
Hybosorus Illigeri, *Reich.*
Linnæi, *Lec.*
Odontotænius subaenescens, *Say.*
Aphodius fimetarius, *Linn.*
Xylotrupes Gideon, *Linn.*
Chrysobothris ruficollis, *Say.*
Euderces picipes, *Fab.*
Desmocerus palliatus, *Forst.*
Centrodera decolorata, *Harr.*
Gaurotes cyanipennis, *Say.*
Typocerus sparsus, *Lec.*
velutinus, *Oliv.*
Leptura nitens, *Forst.*
canadensis, *Oliv.*
vagans (var. brevis, *Kirby*)
Monohammus confusor, *Kirby.*
Urographis fasciatus, *De G.*
Saperda vestita, *Say.*
3-dentata, *Oliv.*
Amphionycha flammata, *Newm.*
Donacia palmata, *Oliv.*
piscatrix, *Lac.*
proxima, *Kirby.*
2 sp. not determined.
Pachybrachys femoratus, *Oliv.*
hepaticus, *Mels.*
Monachus saponatus, *Fab.*
Diachus auratus, *Fab.*
Adoxus obscurus (var. vitis, *Fab.*)
Nanthonia 10-notata, *Say.*
Typophorus canellus (var. atricornis.)
Chrysochus auratus, *Fab.*
Rhabdopterus picipes, *Oliv.*
Doryphora 10-lineata, *Say.*
Chrysomela bigsbyana, *Kirby.*
Gastroidea nymphaeæ, *Linn.*
Diabrotica 12-punctata, *Fab.*
vittata, *Fab.*
Phyllobrotica decorata, *Say.*
Cerotoma 3-fuscata, *Forst.*
Systena pennsylvanica, *Lec.*
Haltica ignita, *Illig.*
Crepidodera helxines, *Linn.*

Epitrix cucumeris, *Harris.*
Systena hudsonias, *Forst.*
marginalis, *Illig.*
Nyctobates pennsylvanica, *De G.*
Xylopinus saperdioides, *Oliv.*
Tenebrio molitor, *Linn.*
Blapstinus interruptus, *Say.*
Uloma impressa, *Mels.*
Diaperis hydni, *Fab.*
Boletotherus bifurcus, *Fab.*
Cistela sericea, *Say.*
Penthe pimelia, *Fab.*
Eustrophus confinis, *Lec.*
Canifa pallipes, *Mels.*
Stenotrachelus arctatus, *Say.*
Anaspis rufa, *Say.*
Mordella melæna, *Germ.*
marginata, *Mels.*
Xylophilus tuberculifer, (*infra.*)
Epicauta pennsylvanica, *De G.*
Attelabus bipustulatus, *Fab.*
Ithycerus noveboracensis, *Forst.*
Lissorhoptrus simplex, *Say.*
Magdalis armicollis, *Say.*
Orchestes niger, *Horn.*
Gymnetron tetrum, *Fab.*
Balaninus uniformis, *Lec.*
Eupsalis minuta, *Drury.*
Dryocœtes, n. sp.

CORRESPONDENCE.

NOTES ON HEPIALUS.

In CAN. ENT., Vol. XXV., p. 124, Mr. Neumoegen and myself referred *Hepialus quadriguttatus* as a synonym of *H. argenteomaculatus*, and described the salmon-colored form as a new variety. To this Mr. Grote objected (CAN. ENT., XXV., 186) and also Dr. Strecker, Proc. Acad. Sci. Phila., p. 282). In view of these opinions, it seems probable that we were wrong, and I correct the synonymy below. In the same paper, Dr. Strecker describes as new *Hepialus los.* I cannot see in his description anything but a form of *argenteomaculatus*, wanting one of the basal silver spots and possessing some additional spots subapically, such as we often see in *quadriguttatus.* I have had in my collection for some years a specimen more extreme than this seems to be, for it has none of the silver spots, being otherwise normally marked. I would propose for it the name *perdita.*

Our species of Hepialus of large size, with the apices of primaries rectangular, may be arranged as follows, and the generic term Stenopis, Pack, may be retained for them :—

S. ARGENTEOMACULATUS, Harris.
argentatus, Packard.
alni, Kellicott.
var. purpurascens, *Packard.*

var. los, *Strecker.*
var. perdita, *Dyar.*
var. quadriguttatus, *Grote.*
semiauratus, Neumoegen and Dyar.
S. THULE, Strecker.
S. AURATUS, Grote.

Dr. Strecker objects to the reference of *quadriguttatus* as a variery of *argenteomaculatus*, and would consider it a distinct species; but I am unable to find a good specific character. I should hesitate to rely on the colour alone in this genus, and have preferred to follow Prof. Smith's "List." HARRISON G. DYAR.

ALEXICLES ASPERSA, Grote.

As pointed out by Prof. Smith, the original description of Alexicles is entirely inadequate. In fact, no characters are given which will determine its family position, the author going as far as to partially retract his own opinion as to its location. I have before me the type, very kindly forwarded to me for examination by Mr. W. A. Snow. It is a true Arctian apparently most nearly allied to Leptarctia. Head moderately prominent, tongue imperceptible; median spurs of hind tibiæ wanting; anterior tibiæ armed at tip with a stout, slightly curved spine or claw. ♂ frenulum a long spine, hooked into a loop on subcostal vein of primaries. Venation arctiiform: one internal vein on primaries, two on secondaries: median veins four branched, normal: cells closed: vein 8 of secondaries from the subcostal more than one-third the length of cell from base. On primaries no accessory cell: veins 7–10 stalked: 8 and 9 forming a short furcation near apex of wing: 7 nearer the furcation and 10 rather near the cell, leaving a long stalk between their origins: vein 11 from the subcostal near end of cell: vein 12 from the base half way between the subcostal vein and costa.

Fore wings narrow, costa straight, apex rounded: hind wings oval.

It is scarcely necessary to add anything to Mr. Grote's description of the species. Though short, it is excellent, as are nearly all of Mr. Grote's specific descriptions. Mr. Grote gives the expanse as 32 mm., but in the type, mounted as usual, the wings reach 36 mm.

HARRISON G. DYAR.

DR. HAGEN.

We deeply regret the loss of our old friend, Dr. Hermann August Hagen, Professor of Entomology in Harvard University, who died, after a long illness, at Cambridge, Mass., on the 9th of November, in the seventy-seventh year of his age.

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ERRATA.

Page 6, 3d line, for *P. tolteca* read *T. tolteca*.

Page 161. 20th line, for "Archilithabius" read "Archilitholius."

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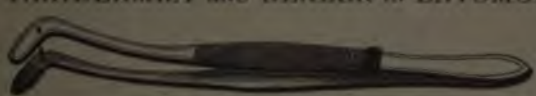

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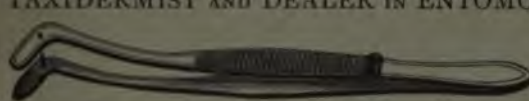

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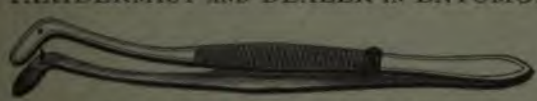

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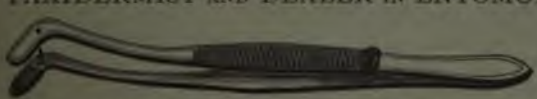

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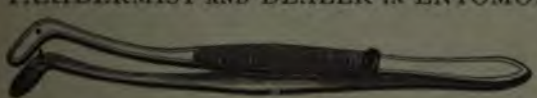

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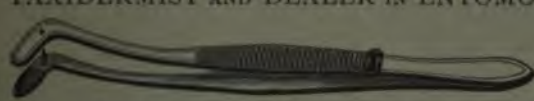

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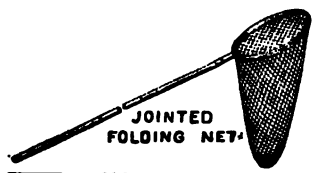

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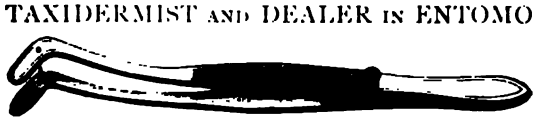

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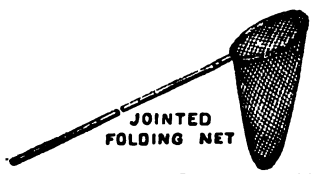

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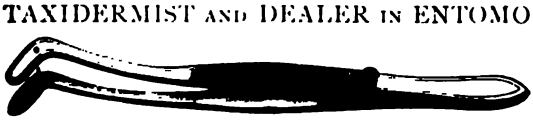

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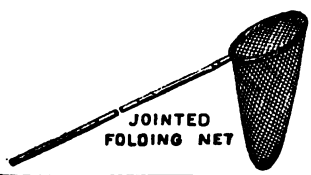

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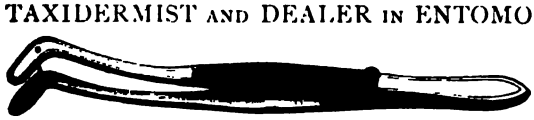

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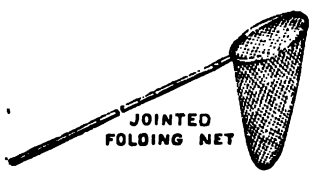

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Victoria Hall, London, Ont.

No. 11.

THE

Canadian Entomologist

VOLUME XXV.

EDITED BY

REV. C. J. S. BETHUNE,

PORT HOPE, ONTARIO.

NOVEMBER, - 1893.

LONDON:
LONDON PRINTING AND LITHOGRAPHING CO.
1893.

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Subscribers are invited to make liberal use of this column. Notices over three lines are liable to be shortened if necessary. All insertions free to subscribers.

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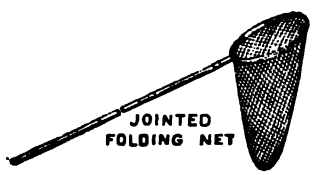

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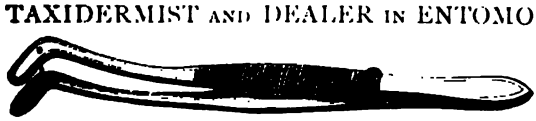

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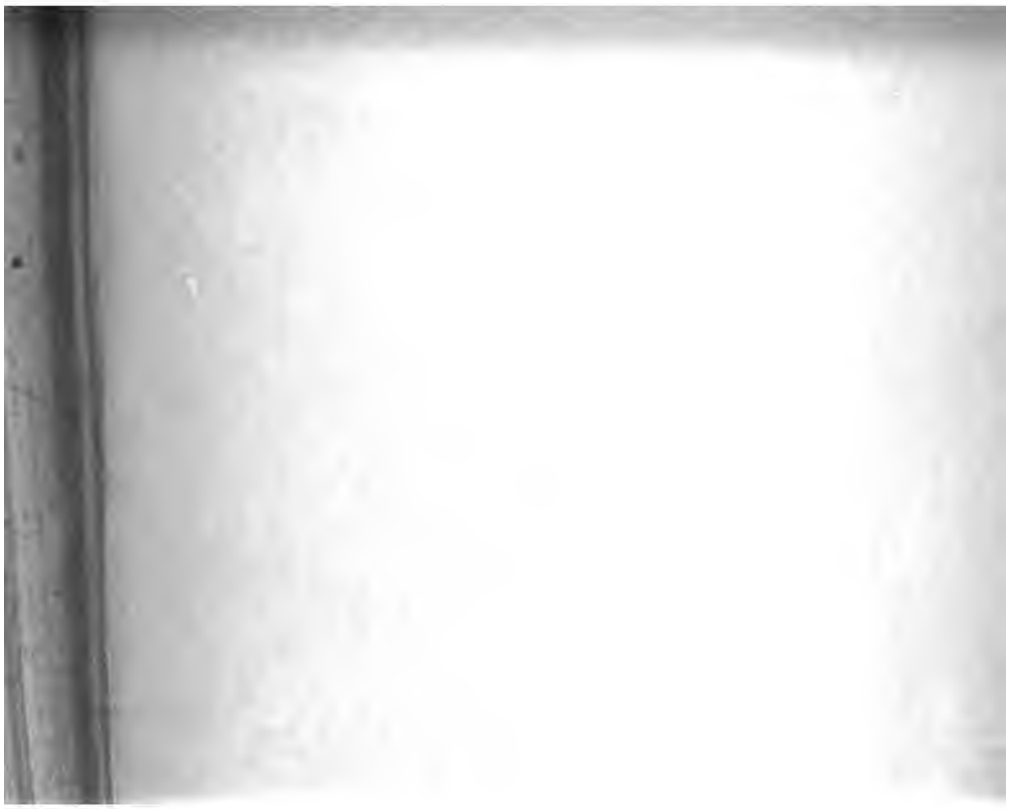

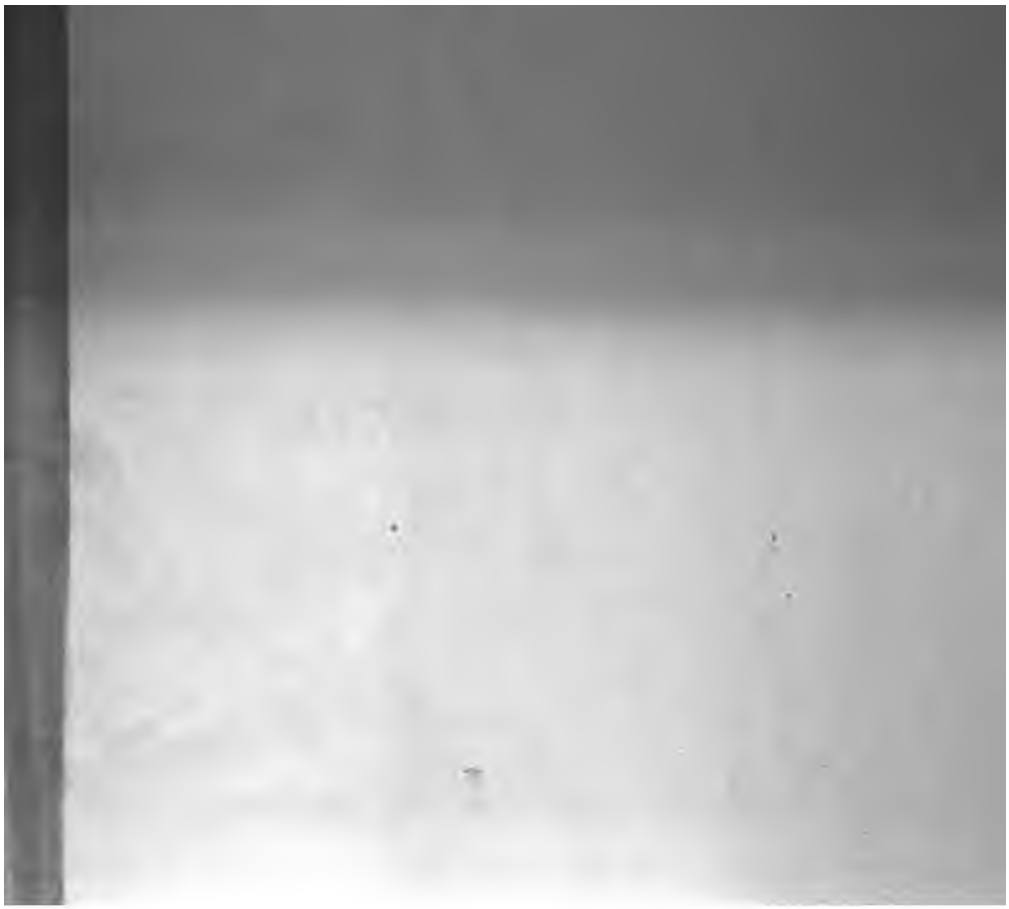

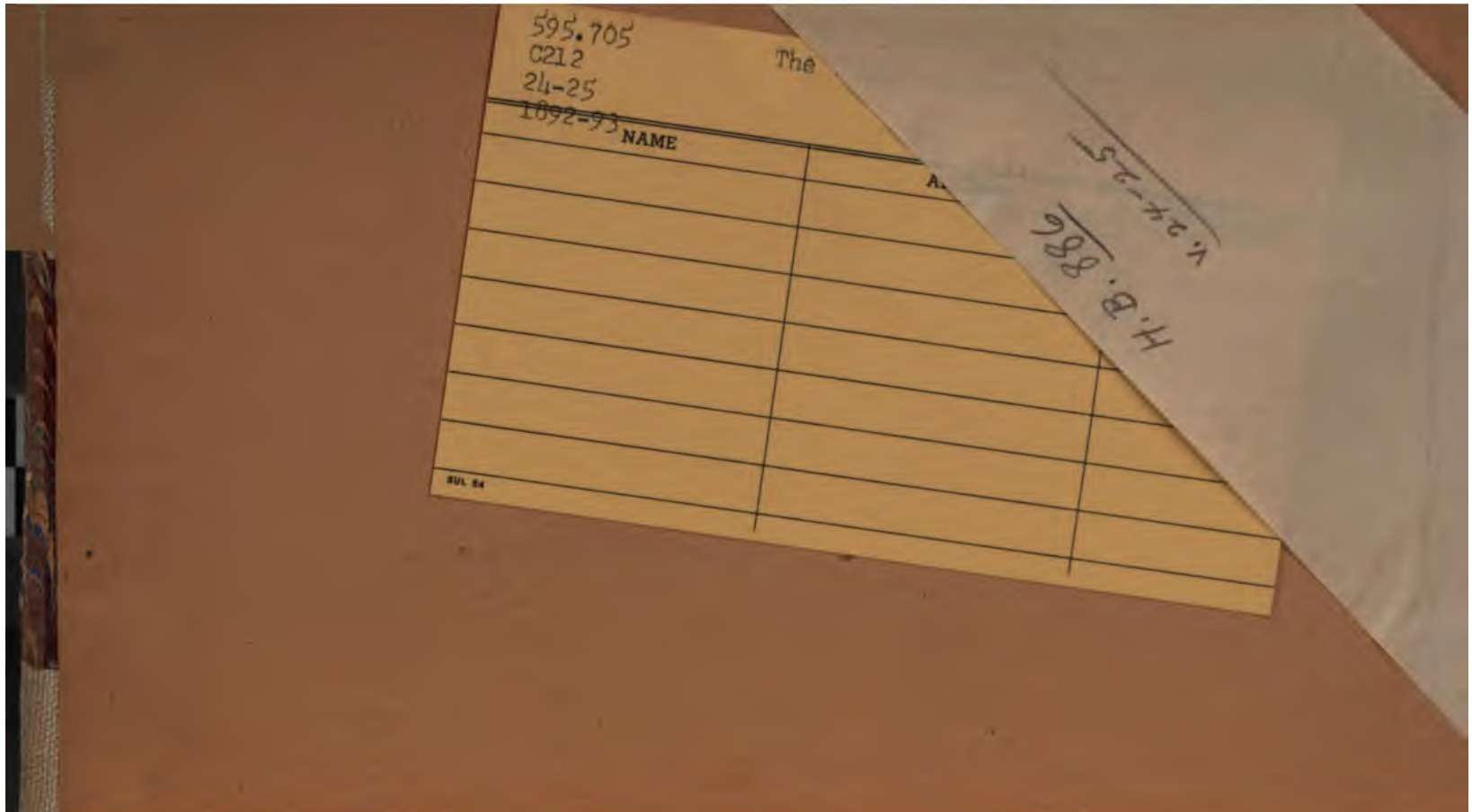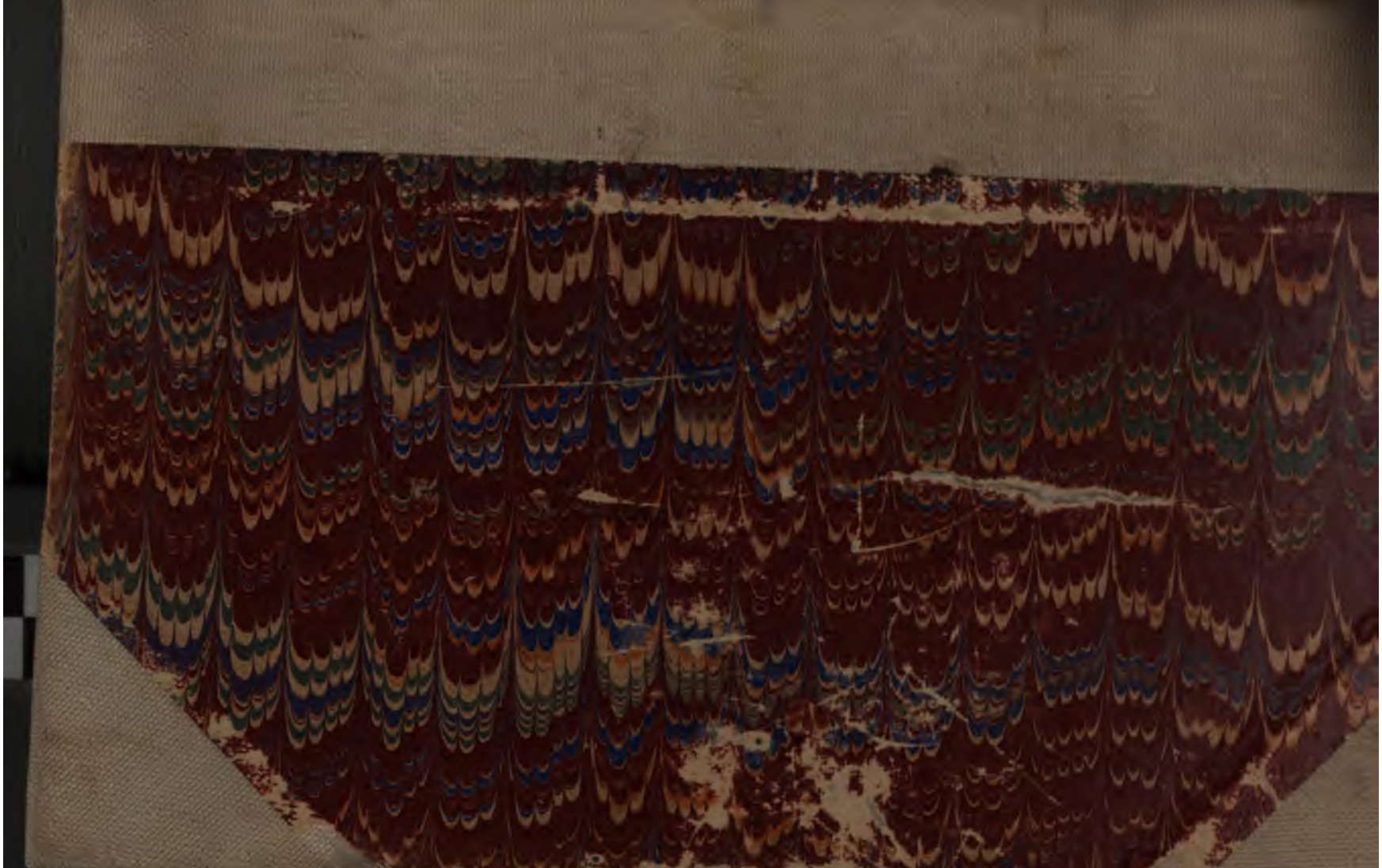
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